REPORT

Alignment Analysis of Science Standards and Assessments

South Dakota
Grades 5, 8, and 11
2008

Norman L. Webb

November 11, 2008

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Acknowledgements

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The South Dakota Department of Education funded this analysis. Gay Pickner, Director of Assessment, Office of Curriculum, Technology, and Assessment, was the main contact person for the South Dakota Department of Education and oversaw the coordination of the study.

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Executive Summary

A three-day alignment institute was held on September 22-24, 2008, in Sioux Falls, South Dakota. Seven reviewers analyzed the agreement among the South Dakota science standards and assessments for grades 5, 8 and 11. Reviewers included science content experts, science teachers, and a state science consultant. Three of the reviewers were from South Dakota and four reviewers were from other states.

The alignment between the South Dakota science standards and assessments varied by grade. The grade 5 science standards and the assessment were acceptably aligned, requiring the replacement of only two items to attain full alignment. The main alignment issue for grade 5 was an absence of assessment items that targeted Strand 5.1 (Nature of Science). The alignment of the grade 8 science standards and the assessment required major improvement, with 13 items needing replacement to attain full alignment. Similarly, the grade 11 science standards and the assessment needed major improvement with 14 items requiring replacement for full alignment. For both grades 8 and 11, the assessment items were not as complex as the expectations in the standards. Although the proportion of the standards judged to have a DOK level 3 increased across the grades, the level of complexity of the assessment items remained fairly constant, with essentially all of the items given a DOK level 1 or 2. Aside from the DOK inconsistency, the tests for grades 8 and 11 were judged to have items that covered the content expected by the standards, with a good range of standards covered, and a good balance in the representation of those standards.

Summary Table
Percent of South Dakota Science Standards with Acceptable Level on Each Alignment Criteria for Grade 5, 8, and 11 for 2008 Science STEP Analysis

Grade	*Categorical Concurrence*	*Depth-of-Knowledge Consistency*	*Range of Knowledge*	*Balance of Representation*	*Estimated Average Number of Items per Form to be Replaced for Full Alignment*
2008					
5	80%	80%	80%	80%	2
8	100%	25%	100%	100%	13
11	100%	0%	100%	100%	14

Categorical Concurrence	≥6 items
Depth-of-Knowledge	≥50% with DOK level the same or higher than level of corresponding objective
Range-of-Knowledge	≥50% of objectives under a standard
Balance of Representation	≥.70 index value

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Introduction

The alignment of expectations for student learning with assessments for measuring students' attainment of these expectations is an essential attribute for an effective standards-based education system. Alignment is defined as the degree to which expectations and assessments are in agreement and serve in conjunction with one another to guide an education system toward students learning what they are expected to know and do. As such, alignment is a quality of the relationship between expectations and assessments and not an attribute of any one of these two system components.

Alignment describes the match between expectations and an assessment that can be legitimately improved by changing either student expectations or the assessments. As a relationship between two or more system components, alignment is determined by using the multiple criteria described in detail in a National Institute for Science Education (NISE) research monograph, *Criteria for Alignment of Expectations and Assessments in Mathematics and Science Education* (Webb, 1997).

A three-day alignment institute was conducted September 22-24, 2008, in Sioux Falls, South Dakota. Seven reviewers—including science content experts, science teachers, and a state science consultant—analyzed the agreement between the South Dakota assessments for science and the South Dakota Science Content Standards for grades 5, 8 and 11 approved in 2005. The STEP assessments administered in Spring 2008 were used in this analysis. Four of the reviewers were from states other than South Dakota and three reviewers were from South Dakota.

South Dakota used the terminology of *goal/strand, indicator,* and *standard*. For science the South Dakota content standards had five strands—nature of science (Strand 1); physical science (Strand P); life science (Strand S); earth/space science (Strand E); science, technology, environment, and society (Strand S). Indicators described key aspects of the goals/strands. The standards under the indicators specified what students were to know and be able to do related to the indicator at the specific grade level.

As part of the alignment institute, reviewers were trained to identify the depth of knowledge (DOK) of the standards and assessment items. This training included reviewing the definitions of the four DOK levels and reviewing examples of each. Then, the reviewers generally participated in a consensus process to determine the DOK levels of the standards and individual analyses of the assessment items. Following individual analyses of the items, reviewers participated in a debriefing discussion in which they

assessed the degree to which they had coded particular items or types of content to the standards.

To derive the results from the analysis, the reviewers' responses were averaged. Any variance among reviewers was considered legitimate, with the true DOK level for the item falling somewhere between the two or more assigned values. Such variation could signify a lack of clarity in how the standards were written, the robustness of an item that could legitimately correspond to more than one standard and/or a DOK that falls in between two of the four defined levels. Reviewers were allowed to identify one assessment item as corresponding to up to three standards—one primary hit (standard) and up to two secondary hits. However, reviewers could only code one DOK level to each assessment item, even if the item corresponded to more than one standard.

Reviewers were instructed to focus primarily on the alignment between the state's standards and assessments. However, reviewers were encouraged to offer their opinions on the quality of the standards or of the assessment activities/items by writing a note about the item. Reviewers also could indicate whether there was a source-of-challenge issue with the item—i.e., a problem with the item that might cause the student who knows the material to give a wrong answer or enable someone who does not have the knowledge being tested to answer the item correctly.

The results produced from the institute pertain only to the issue of alignment between the South Dakota Science Standards and the assessments. Note that an alignment analysis of this nature does not serve as external verification of the general quality of the state's standards or assessments. Rather, only the degree of alignment is discussed in the results. For these results, the means of the reviewers' coding were used to determine whether the alignment criteria were met. When reviewers did vary in their judgments, the means lessened the error that might result from any one reviewer's finding. Standard deviations are reported in the tables provided in Appendix B, which give one indication of the variance among reviewers.

This report describes the results of an alignment study of the South Dakota science STEP assessment administered in the spring of 2008 and science content standards for grades 5, 8, and 11. The study addressed specific criteria related to the content agreement between the state's standards and grade-level assessments. Four criteria received major attention: categorical concurrence, depth-of-knowledge consistency, range-of-knowledge correspondence and balance of representation.

Alignment Criteria Used for This Analysis

This analysis judged the alignment between the standards and the assessments on the basis of four criteria. Information is also reported on the quality of items by identifying items with sources-of-challenge and other issues. For each alignment criterion, an acceptable level was defined by what would be required to assure that a student had met the standards.

Categorical Concurrence

An important aspect of alignment between standards and assessments is whether both address the same content categories. The categorical-concurrence criterion provides a very general indication of alignment if both documents incorporate the same content. *The criterion of categorical concurrence between standards and assessments is met if the same or consistent categories of content appear in both documents.* This criterion was judged by determining whether the assessment included items measuring content from each strand. The analysis assumed that the assessment had to have at least six items for measuring content from a strand in order for an acceptable level of categorical concurrence to exist between the strand and the assessment. The number of items, six, is based on estimating the number of items that could produce a reasonably reliable subscale for estimating students' mastery of content on that subscale. Of course, many factors have to be considered in determining what a reasonable number is, including the reliability of the subscale, the mean score, and cutoff score for determining mastery. Using a procedure developed by Subkoviak (1988) and assuming that the cutoff score is the mean and that the reliability of one item is .1, it was estimated that six items would produce an agreement coefficient of at least .63. This indicates that about 63% of the group would be consistently classified as masters or nonmasters if two equivalent test administrations were employed. The agreement coefficient would increase if the cutoff score is increased to one standard deviation from the mean to .77 and, with a cutoff score of 1.5 standard deviations from the mean, to .88. Usually states do not report student results by strands or require students to achieve a specified cutoff score on indicators related to a strand. If a state did do this, then the state would seek a higher agreement coefficient than .63. Six items were assumed as a minimum for an assessment measuring content knowledge related to a strand, and as a basis for making some decisions about students' knowledge of that strand. If the mean for six items is 3 and one standard deviation is one item, then a cutoff score set at 4 would produce an agreement coefficient of .77. Any fewer items with a mean of one-half of the items would require a cutoff that would only allow a student to miss one item. This would be a very stringent requirement, considering a reasonable standard error of measurement on the subscale.

Depth-of-Knowledge Consistency

Standards and assessments can be aligned not only on the category of content covered by each, but also on the basis of the complexity of knowledge required by each. *Depth-of-knowledge consistency between standards and assessment indicates alignment if what is elicited from students on the assessment is as demanding cognitively as what students are expected to know and do as stated in the standards.* For consistency to exist between the assessment and the strands, as judged in this analysis, at least 50% of the items corresponding to a strand had to be at or above the depth-of-knowledge level of the corresponding standards: 50%, a conservative cutoff point, is based on the assumption that a minimal passing score for any one strand of 50% or higher would require the student to successfully answer at least some items at or above the depth-of-knowledge level of the corresponding standards. For example, assume an assessment included six items related to one strand and students were required to answer correctly four of those

items to be judged proficient—i.e., 67% of the items. If three, 50%, of the six items were at or above the depth-of-knowledge level of the corresponding standards, then for a student to achieve a proficient score would require the student to answer correctly at least one item at or above the depth-of-knowledge level of one standard. Some leeway was used in this analysis on this criterion. If a strand had between 40% and 50% of items at or above the depth-of-knowledge levels of the standards, then it was reported that the criterion was "weakly" met.

Interpreting and assigning depth-of-knowledge levels to both standards within strands and assessment items are essential requirements of alignment analysis. These descriptions help to clarify what the different levels represent in science:

Level 1 (Recall and Reproduction) is the recall of information such as a fact, definition, term, or a simple procedure, as well as performing a simple science process or procedure. Level 1 only requires students to demonstrate a rote response, use a well-known formula, follow a set procedure (e.g. a recipe), or perform a clearly defined series of steps. A "simple" procedure is well defined and typically involves only one step. Verbs such as "identify," "recall," "recognize," "use," "calculate," and "measure" generally represent cognitive work at the recall and reproduction level. Simple word problems that can be directly translated into and solved by a formula are considered Level 1. Verbs such as "describe" and "explain" could be classified at different DOK levels, depending on the complexity of what is to be described and explained.

A student answering a Level 1 item either knows the answer or does not: that is, the answer does *not* need to be "figured out," or "solved." In other words, if the knowledge necessary to answer an item automatically provides the answer to the item, then the item is at Level 1. If the knowledge necessary to answer the item does *not* automatically provide the answer, the item is at least at Level 2.

Level 2 (Skills and Concepts) 2 includes the engagement of some mental processing beyond recalling or reproducing a response. The content knowledge or process involved is more complex than in Level 1. Items require students to make some decisions as to how to approach the question or problem. Keywords that generally distinguish a Level 2 item include "classify," "organize," "estimate," "make observations," "collect and display data," and "compare data." These actions imply more than one step. For example, to compare data requires first identifying characteristics of the objects or phenomenon and then grouping or ordering the objects. Level 2 activities include making observations and collecting data; classifying, organizing, and comparing data; and organizing and displaying data in tables, graphs, and charts.

Some action verbs, such as "explain," "describe," or "interpret," could be classified at different DOK levels, depending on the complexity of the action. For example, interpreting information from a simple graph, requiring reading information from the graph, is at Level 2. An item that requires interpretation from a complex graph, such as making decisions regarding features of the graph that need to be considered and how information from the graph can be aggregated, is at Level 3.

Level 3 (Strategic Thinking) requires reasoning, planning, using evidence, and a higher level of thinking than the previous two levels. The cognitive demands at Level 3 are complex and abstract. The complexity does *not* result only from the fact that there could be multiple answers, a possibility for both Levels 1 and 2, but because the multi-step task requires more demanding reasoning. In most instances, requiring students to explain their thinking is at Level 3; requiring a very simple explanation, or a word or two, should be at Level 2. An activity that has more than one possible answer and requires students to justify the response they give would most likely be a Level 3. Experimental designs in Level 3 typically involve more than one dependent variable. Other Level 3 activities include drawing conclusions from observations; citing evidence and developing a logical argument for concepts; explaining phenomena in terms of concepts; and using concepts to solve non-routine problems.

Level 4 (Extended Thinking). Tasks at Level 4 have high cognitive demands and are very complex. Students are required to make several connections—relate ideas within the content area or among content areas—and have to select or devise one approach among many alternatives on how the situation can be solved. Many on-demand assessment instruments will *not* include any assessment activities that could be classified as Level 4. However, standards, goals, and objectives can be stated in such a way as to expect students to perform extended thinking. "Develop generalizations of the results obtained and the strategies used and apply them to new problem situations," is an example of a grade 8 objective that is at Level 4. Many, but *not* all, performance assessments and open-ended assessment activities requiring significant thought will be Level 4.

Level 4 requires complex reasoning, experimental design and planning, and probably will require an extended period of time either for the science investigation required by an objective, or for carrying out the multiple steps of an assessment item. However, the extended time period is *not* a distinguishing factor if the required work is only repetitive and does not require applying significant conceptual understanding and higher-order thinking. For example, if a student has to take the water temperature from a river each day for a month and then construct a graph, this would be classified as a Level 2 activity. However, if the student conducts a river study that requires taking into consideration a number of variables, this would be at Level 4.

Range-of-Knowledge Correspondence

For standards and assessments to be aligned, the breadth of knowledge required on both should be comparable. *The range-of-knowledge criterion is used to judge whether a comparable span of knowledge expected of students by a strand is the same as, or corresponds to, the span of knowledge that students need in order to correctly answer the assessment items/activities.* The criterion for correspondence between span of knowledge for a strand and an assessment considers the number of standards within the strand with one related assessment item/activity. Fifty percent of the standards for a strand had to have at least one related assessment item in order for the alignment on this

criterion to be judged acceptable. This level is based on the assumption that students' knowledge should be tested on content from over half of the domain of knowledge for a strand. This assumes that each standard for a strand should be given equal weight. Depending on the balance in the distribution of items and the need to have a low number of items related to any one standard, the requirement that assessment items need to be related to more than 50% of the standards for an strand increases the likelihood that students will have to demonstrate knowledge on more than one standard per strand to achieve a minimal passing score. As with the other criteria, a state may choose to make the acceptable level on this criterion more rigorous by requiring an assessment to include items related to a greater number of the standards. However, any restriction on the number of items included on the test will place an upper limit on the number of standards that can be assessed. Range-of-knowledge correspondence is more difficult to attain if the content expectations are partitioned among a greater number of strands and a large number of standards. If 50% or more of the standards for a strand had a corresponding assessment item, then the range-of-knowledge correspondence criterion was met. If between 40% and 50% of the standards for a strand had a corresponding assessment item, the criterion was "weakly" met.

Balance of Representation

In addition to comparable depth and breadth of knowledge, aligned standards and assessments require that knowledge be distributed equally in both. The range-of-knowledge criterion only considers the number of standards within a strand hit (a standard with a corresponding item); it does not take into consideration how the hits (or assessment items/activities) are distributed among these standards. *The balance-of-representation criterion is used to indicate the degree to which one standard is given more emphasis on the assessment than another.* An index is used to judge the distribution of assessment items. This index only considers the standards for a strand that have at least one hit—i.e., one related assessment item per standard. The index is computed by considering the difference in the proportion of standards and the proportion of hits assigned to the standard. An index value of 1 signifies perfect balance and is obtained if the hits (corresponding items) related to a strand are equally distributed among the standards for the given strand. Index values that approach 0 signify that a large proportion of the hits are on only one or two of all of the standards hit. Depending on the number of standards and the number of hits, a unimodal distribution (most items related to one standard and only one item related to each of the remaining standards) has an index value of less than .5. A bimodal distribution has an index value of around .55 or .6. Index values of .7 or higher indicate that items/activities are distributed among all of the standards at least to some degree (e.g., every standard has at least two items) and is used as the acceptable level on this criterion. Index values between .6 and .7 indicate the balance-of-representation criterion has only been "weakly" met.

Source-of-Challenge Criterion

The source-of-challenge criterion is only used to identify items on which the major cognitive demand is inadvertently placed and is other than the targeted science

standard or expectation. Cultural bias or specialized knowledge could be reasons for an item to have a source-of-challenge problem. Such item characteristics may result in some students not answering an assessment item, or answering an assessment item incorrectly, or at a lower level, even though they possess the understanding and skills being assessed.

Findings

Standards

The consensus DOK value for each science standard for each of grades 5, 8, and 11 can be found in Appendix A. Table 1 shows the percentages of standards at each DOK level by grade. The science standards adopted in 2005 increased in complexity across the grades. Reviewers found that a majority of the grade 5 standards had a DOK level 1 (recall and recognition). For grades 8 and 11, the majority of the standards had a DOK level 2 (skill and concept). The grade 11 standards had the highest percentage of standards with a DOK level 3 (strategic thinking). Overall, the science standards increased in complexity from mainly factual expectations in the lower grades to more conceptual understanding and reasoning in the higher grades.

Table 1. *Percent of Standards by Depth-of-Knowledge (DOK) Levels for Grades 5, 8, and 11 South Dakota Alignment Analysis for Science*

Grade	Total Number of Standards	DOK Level	Number of Standards by Level	Percent within Strand by Level
5	20	1 2 3	13 6 1	65 30 5
8	14	1 2 3	2 10 2	14 71 14
11	30	1 2 3	2 21 7	6 70 23

If no particular objective is targeted by a given assessment item, reviewers are instructed to code the item at the level of a learning goal or a standard. This coding to a generic objective sometimes indicates that the item is inappropriate for the grade level. However, if the item is grade-appropriate, then this situation may instead indicate that there is a part of the content not expressly or precisely described in the objectives. These items may highlight areas in the objectives that should be changed, or made more precise. Table 2 displays the assessment items coded to generic objectives by more than one reviewer. For each grade, only one item was coded to a generic standard, and only by a subset of the reviewers. This means that reviewers were generally able to find a matching standard for each item. The lack of use of generic standards provides one indication that

the standards were written clearly and the assessment items targeted the specific content as described by the standards.

Table 2
Items Coded to Generic Objectives by More Than One Reviewer, South Dakota Alignment Analysis for Science, Grades 5, 8, and 11 2008

Grade	Generic Objective	Assessment Item (Number of Reviewers)
5	5.P.2	38(2)
5	5.L.3	63(3)
11	9-12.P.2	57(4)

Reviewers' debriefing comments also highlight some ambiguities in the objectives. These comments can be found in Appendix D.

Alignment of Curriculum Standards and Assessments

Table 3 displays the number of items and points for each assessment form. In the analysis that follows, multiple-point items would be given additional weight for alignment purposes. For example, a 3-point item would be counted towards the alignment as 3 identically coded 1-point items. Because all of the items were assigned one point on these assessments, the total point value was equal to the total number of items on each test.

Table 3
Number of Items and Point Value by Grade for South Dakota Assessments, Grades 5, 8, and 11 2008

Grade Level	Number of Items	Number of Multi-Point Items	Total Point Value
5	70	0	70
8	70	0	70
11	84	0	84

The results of the analysis for each of the four alignment criteria are summarized in Tables 4.1-4.3. More detailed data on each of the criteria are given in Appendix B, in the first three tables. With each table and for each grade, a description of the satisfaction of the alignment criteria for the given grade is provided. The reviewers' debriefing comments provide further detail about the individual reviewers' impressions of the alignment.

In Tables 4.1-4.3, "YES" indicates that an acceptable level was attained between the assessment and the learning goal on the criterion. "WEAK" indicates that the criterion was nearly met, within a margin that could simply be due to error in the system. "NO" indicates that the criterion was not met by a noticeable margin—10% over an acceptable level for Depth-of-Knowledge Consistency, 10% over an acceptable level for Range-of-

Knowledge Correspondence, and .1 under an index value of .7 for Balance of Representation. "NT" indicated that the criterion was not tested. This occurs if less than two test items are coded to a standard, in which case the other criteria are not applicable.

Grade 5

The grade 5 science standards and assessment needed slight improvement be aligned. Only slight improvement is required for full alignment. The main issue was an absence of items that targeted Strand 5.1 (Nature of Science). There were no items on the assessment that the majority of reviewers judged aligned to standards under this strand. Consequently, DOK Consistency, Range of Knowledge, and Balance of Representation are not measurable, and are marked Not Tested (NT) in Table 4.1. For the other standards, all four of the alignment criteria were acceptably met. For each of these standards the assessment had six or more items (Categorical Concurrence) and at least half of the items with a DOK level that was the same or higher than the DOK level of the corresponding standard (Depth-of-Knowledge Consistency). The items also were nearly evenly distributed among the standards (Range and Balance).

The reviewers noted that the coverage of standards by the assessment and the DOK of the items were generally good. Several reviewers noted an absence of DOK 3 items. However, the absence of DOK 3 items is consistent with Grade 5 standards. A majority of reviewers coded 26 items to Strand L (Life Science), compared with 20 items to Strand P (Physical Science), 14 to Strand E (Earth/Space Science), eight to Strand S (Science, Technology, Environment, and Society), and zero to Strand 1 (Nature of Science). There was no single item for which the majority of reviewers found a source-of-challenge issue. However, at least two reviewers noted a source-of-challenge issue for Items 11, 17, 26, and 33. A review of all source-of-challenge comments is recommended, as one reviewer may have noticed an issue that others did not. In their notes, some reviewers commented that test items (e.g. 17, 26, 47) assessed enabling skills (bullets and check marks). In their debriefing notes, reviewers explained that these check-marks are intended to indicate content that is to be assessed in future years. Reviewers also expressed some concern about the reading level of some items, and felt that some items were reading-for-inference.

Table 4.1
Summary of Acceptable Levels on Alignment Criteria for Science Grade 5 Standards and Assessments for South Dakota Alignment Analysis 2008

Grade 5	***Alignment Criteria***			
Standards	*Categorical Concurrence*	*Depth-of-Knowledge Consistency*	*Range of Knowledge*	*Balance of Representation*
5.1 - NATURE OF SCIENCE	NO (0.57)	NT	NT	NT
5.P - PHYSICAL SCIENCE	YES	YES	YES	YES
5.L - LIFE SCIENCE	YES	YES	YES	YES
5.E - EARTH/SPACE SCIENCE	YES	YES	YES	YES
5.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	YES	YES	YES	YES

In the opinion of the reviewers, two reviewers felt the grade 5 science standards and assessment were acceptably aligned while the other five felt the alignment needed slight improvement. The data indicate that improvement is necessary. In order to attain Categorical Concurrence, six items would need to be replaced by items that target Strand 1 objectives. For full alignment, these items would also need to be written at the appropriate DOK level.

Grade 8

The alignment between the grade 8 standards and the assessment needed major improvement, due to a lack of DOK consistency for all strands except Earth Science. At grade 8 only four standards were included in the analysis. A note in the standards indicated that grade 8 should emphasize earth and space science and should not include any life science. The assessment reflected the emphasis on Strand E (Earth/Space Science) by including 28 items, as indicated by the majority of reviewers, which targeted standards under this strand. The remainder of the assessment items was nearly evenly distributed among the other three strands, with 13 or 14 items per strand. All of the standards under the four strands had at least one item with the items reasonably distributed so that range and balance were both good. The main alignment issue was that too many of the items for three of the four strands (Nature of Science, Physical Science, and Science, Technology, Environment, and Society) had a DOK level that was lower than the DOK level of the corresponding standard. Reviewers found that essentially all of the items on the Grade 8 assessment had a DOK level 1 or 2 whereas two of the standards had a DOK level 3.

A majority of reviewers did verify in their comments that the assessment coverage of the grade 8 standards was good, and that the most important topics under the standards were addressed in some way by the assessment. In source-of-challenge comments, a majority of reviewers felt that Item 56 had more than one possible answer. Two or more

reviewers noted a source-of-challenge issue for Item 16. A review of all source-of-challenge comments is recommended, as one reviewer may have noticed an issue that others did not. All reviewers expressed concern in their notes about Item 10. They expressed doubt about if and how students would use a graph that was presented in the stem of the item. In their notes, some reviewers also identified several items that they felt matched a check-mark standard.

In their opinion, five reviewers felt the alignment at Grade 8 was acceptable and two reviewers felt the alignment needed slight improvement. Although by the opinion of the reviewers the alignment was good, the results of the analysis indicated that 13 items would need to be replaced by items with a higher DOK level to have full alignment—five items for Strand 8N, four items for Strand 8P, and four items for Strand 8S. Because a total of 13 items would need to be replaced with items of higher DOK level, the alignment overall was considered to need major improvement.

Table 4.2
Summary of Acceptable Levels on Alignment Criteria for Science Grade 8 Standards and Assessments for South Dakota Alignment Analysis 2008

Grade 8	***Alignment Criteria***			
Standards	*Categorical Concurrence*	*Depth-of-Knowledge Consistency*	*Range of Knowledge*	*Balance of Representation*
8.N - NATURE OF SCIENCE	YES	NO	YES	YES
8.P - PHYSICAL SCIENCE	YES	NO	YES	YES
8.E - EARTH/SPACE SCIENCE	YES	YES	YES	YES
8.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	YES	NO	YES	YES

Grade 11

For grade 11, the alignment of the science standards for grades 9-12 and the assessment needed major improvement, due to lack of DOK consistency for all strands. Categorical Concurrence, Range-of-Knowledge Correspondence, and Balance of Representation were acceptably met for all five strands. Two or more reviewers noted a source-of-challenge issue for items 20 and 44. Other reviewers expressed concern about item 20 in their notes. Nearly all reviewers felt that the diagram for that item was unclear. A review of all source-of-challenge comments is recommended, as one reviewer may have noticed an issue that others did not. In the opinion of the reviewers, three indicated that the alignment was acceptable and four indicated that alignment needed slight improvement. While the other criteria were met, the data indicate that major improvement is required due to DOK inconsistency.

The main alignment issue for grade 11 was the low DOK levels of the items compared with the standards. While the level of complexity of the standards increased from earlier grades, the DOK levels of the items remained steady. Overall, a total of 14 items would need to be replaced by items with a higher DOK level to attain full alignment—five items for Strand 9-12 N, one item for Strand 9-12 P, four items for Strand 9-12 L, two items for Strand 9-12 E, and two items for Strand 9-12 S. Because nearly 20 percent of the items would require replacement to attain full alignment, based on this analysis the alignment was judged to need major improvement.

Table 4.3
Summary of Acceptable Levels on Alignment Criteria for Science Grade 11 Standards and Assessments for South Dakota Alignment Analysis 2008

Grade 11	***Alignment Criteria***			
Standards	*Categorical Concurrence*	*Depth-of-Knowledge Consistency*	*Range of Knowledge*	*Balance of Representation*
9-12.N - NATURE OF SCIENCE	YES	NO	YES	YES
9-12.P - PHYSICAL SCIENCE	YES	WEAK	YES	YES
9-12.L - LIFE SCIENCE	YES	NO	YES	YES
9-12.E - EARTH/SPACE SCIENCE	YES	WEAK	YES	YES
9-12.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	YES	WEAK	YES	YES

Source of Challenge Issue

Reviewers were instructed to document any source-of-challenge issue and to provide any other comments they may have. These comments can be found in Tables (grade).5 and (grade).7 in Appendix C. There were only eight items, from the assessments for all three grades, that two or more reviewers identified as having a source-of-challenge issue (grade 5 Items 11, 17, 26, and 33; grade 8, item 16 and 56; grade 11, item 20 and 44). For each of these items the reviewers noted their rationale, including confusion with diagrams and problems with the representation of the science. All notes on source of challenge issues should be reviewed. It is possible that one reviewer discovered an issue that other reviewers did not detect.

Reviewers' Comments

Along with source-of-challenge issue comments, reviewers were asked to provide any other notes they may have. These comments can be found in Tables (grade).7 in Appendix C. There are a number of notes by reviewers on specific assessment items. Many of these notes identify ways an item did not specifically address a standard, questioned the accuracy of an item, or questioned the view of science portrayed by the

item. After coding each grade-level assessment, reviewers also were asked to respond to five debriefing questions. All of the comments made by the reviewers are given in Appendix D. The notes in general offer an opinion on the coverage of the standards by items and the appropriateness of the DOK level of items. Some of the debriefing notes have been given above for each of the grades.

Reliability Among Reviewers

The overall intraclass correlation among the Science reviewers' assignment of DOK levels to items was high for seven reviewers for Grades 5, 8, and 11 (Table 5). An intraclass correlation value greater than 0.8 generally indicates a high level of agreement among the reviewers. A pairwise comparison is used to determine the degree of reliability of reviewer coding at the objective level and at the learning goal level. The pairwise comparison values are moderate, while the objective values are overall high.

Table 5
Intraclass and Pairwise Comparisons, South Dakota Alignment Analysis for Science Grades 5, 8, and 11 Assessments 2008

Grade	Intraclass Correlation	Pairwise Comparison:	Pairwise: Objective	Pairwise: Standard
5	.82	.68	.80	.90
8	.74	.62	.90	.94
11	.80	.66	.70	.88

Summary

A three-day alignment institute was held on September 22-24, 2008, in Sioux Falls, South Dakota. Seven reviewers analyzed the agreement among the South Dakota science standards and assessments for grades 5, 8 and 11. Reviewers included science content experts, science teachers, and a state science consultant. Three of the reviewers were from South Dakota and four reviewers were from other states.

The alignment between the South Dakota science standards and assessments varied by grade. The grade 5 science standards and the assessment were acceptably aligned, requiring the replacement of only two items to attain full alignment. The main alignment issue for grade 5 was an absence of assessment items that targeted Strand 5.1 (Nature of Science). The alignment of the grade 8 science standards and the assessment required major improvement, with 13 items needing replacement to attain full alignment. Similarly, the grade 11 science standards and the assessment needed major improvement with 14 items requiring replacement for full alignment. For both grades 8 and 11, the assessment items were not as complex as the expectations in the standards. Although the proportion of the standards judged to have a DOK level 3 increased across the grades, the level of complexity of the assessment items remained fairly constant, with essentially all of the items given a DOK level 1 or 2. Aside from the DOK inconsistency, the tests for grades 8 and 11 were judged to have items that covered the content expected by the

standards, with a good range of standards covered, and a good balance in the representation of those standards.

Summary Table
Percent of South Dakota Science Standards with Acceptable Level on Each Alignment Criteria for Grade 5, 8, and 11 for 2008 Science STEP Analysis

Grade	*Categorical Concurrence*	*Depth-of-Knowledge Consistency*	*Range of Knowledge*	*Balance of Representation*	*Estimated Average Number of Items per Form to be Replaced for Full Alignment*
2008					
5	80%	80%	80%	80%	2
8	100%	25%	100%	100%	13
11	100%	0%	100%	100%	14

Categorical Concurrence	≥6 items
Depth-of-Knowledge	≥50% with DOK level the same or higher than level of corresponding objective
Range-of-Knowledge	≥50% of objectives under a standard
Balance of Representation	≥.70 index value

References

Subkoviak, M. J. (1988). A practitioner's guide to computation and interpretation of reliability indices for mastery tests. *Journal of Educational Measurement, 25*(1), 47-55.

Webb, N. L. (1997). *Criteria for alignment of expectations and assessments in mathematics and Mathematics education*. Council of Chief State School Officers and National Institute for Mathematics Education Research Monograph No. 6. Madison: University of Wisconsin, Wisconsin Center for Education Research.

Appendix A

South Dakota
Grades 5, 8, and 11
Science
Standards and Group Consensus
DOK Values

Table 5.14
Group Consensus
South Dakota Science Content Standards, Science, Grade 5

Level	Description	DOK
5.1	NATURE OF SCIENCE	3
5.1.1	Understand the nature and origin of scientific knowledge.	1
5.1.1.1	? Investigate scientific contributions of people who have revolutionized scientific thinking. ? Describe science as a body of knowledge and an investigative process. ? Describe how scientific knowledge increases and changes over time.	1
5.1.2	Apply the skills necessary to conduct scientific investigations.	3
5.1.2.1	? Use investigations in science to accumulate knowledge. Example: Record daily weather conditions to form a weather pattern. • Make observations. • Make predictions. • Differentiate between a hypothesis and a prediction. • Ask questions. • Formulate hypotheses based on cause and effect relationships. • Plan investigations. • Use appropriate scientific equipment and proper safety procedures in all investigations. • Use appropriate metric measurement to collect, record, chart, and/or graph data. • Interpret data and recognize numerical data that are contradictory or unusual in experimental results. • Communicate results. • Define variables that must be held constant in a specific experimental situation.	3
5.P	PHYSICAL SCIENCE	1
5.P.1	Describe structures and properties of, and changes in, matter.	1
5.P.1.1	Students are able to define matter on the basis of observable physical properties. Examples: mass, volume, density, magnetism, physical state, and the ability to conduct heat, electricity, and sound • Explain the relationships among elements, molecules, and matter. Examples: carbon dioxide, water ? Explain differences and similarities between a solution and other mixtures and changes that occur within. Examples: solution (sugar dissolving in water) and mixture (trail mix)	1
5.P.2	Analyze forces, their forms, and their effects on motions.	2
5.P.2.1	Students are able to identify forces in specific situations that require objects to interact, change directions, or stop. • Give examples of ways gravitational forces affect every object.	1
5.P.2.2	Students are able to analyze the structure and design of simple and compound machines to determine how the machines make work easier by trading force for distance. • Distinguish between simple and compound machines. Examples: lever, pulley, wheel, axle, inclined plane, wedge, screw Example: how scissors cut paper	2
5.P.3	Analyze interactions of energy and matter.	1
5.P.3.1	Students are able to demonstrate and explain how to measure heat flow into an object.	1

Table 5.14
Group Consensus
South Dakota Science Content Standards, Science, Grade 5

Level	Description	DOK
	Example: Measure temperatures of various materials placed in sunlight. • Interpret a thermometer.	
5.P.3.2	Students are able to describe the Sun's ability to produce energy in the forms of light and heat. • Understand that the Sun produces energy. Example: energy from the Sun stored in coal and plants ? Describe significant characteristics of different forms of energy. ? Explain energy transfers and transformation of light.	1
5.P.3.3	Students are able to describe basic properties of light. Examples: reflection, scattering, color spectrum, shadows.	1
5.L	LIFE SCIENCE	2
5.L.1	Understand the fundamental structures, functions, classifications, and mechanisms found in living things.	1
5.L.1.1	Students are able to describe the basic process of photosynthesis and the role of light as a source of energy in plants. • Use words to describe photosynthesis. Example: Carbon dioxide + water ? sunlight; chlorophyll = sugar and oxygen.	1
5.L.2	Analyze various patterns and products of natural and induced biological change.	2
5.L.2.1	Students are able to predict physical characteristics with family lineage. • Describe family trees. • Explain how physical traits pass from generation to generation. Examples: height, hair color, eye color	2
5.L.2.2	Students are able to describe structures and processes involved in plant reproduction. Example: fertilization • Know parts of the plant.	1
5.L.3	Analyze how organisms are linked to one another and the environment.	2
5.L.3.1	Students are able to describe how natural events and/or human influences may help or harm ecosystems. Example: biotic (over-population) and abiotic (floods) • Define ecosystem.	2
5.L.3.2	Students are able to analyze the roles of organisms to determine the transfer of energy using an energy pyramid model. Examples: producer, consumer, decomposer, herbivore, carnivore, omnivore, predator – prey • Define an energy pyramid. • Define an organism.	2
5.L.3.3	Students are able to describe how interrelationships enable some organisms to survive. • Define interrelationships. ? Adaptation, parasitism, mutation	1
5.E	EARTH/SPACE SCIENCE	1
5.E.1	Analyze the various structures and processes of the Earth system.	1
5.E.1.1	Students are able to describe the basic structure of Earth's interior. • Define crust, mantle, and core.	1

Table 5.14
Group Consensus
South Dakota Science Content Standards, Science, Grade 5

Level	Description	DOK
	? Explain the formation of geological features of the Earth through plate tectonics. Examples: volcanoes, faults, ocean trenches ? Describe how Earth's surface is constantly changing. Examples: earthquakes, volcanoes, weathering, erosion, and deposition ? Examine topographical maps.	
5.E.2	Analyze essential principles and ideas about the composition and structure of the universe.	1
5.E.2.1	Students are able to describe the components (Sun, planets, and moons) of the solar system. • Relative size • Order and relative distance from the Sun and each other ? Describe the relative scale of the Earth to the Sun, planets, and the Moon.	1
5.E.2.2	Students are able to explain how the Earth's rotation affects the appearance of the sky. • Constellations appear to move as a result of Earth's rotation. Example: The Big Dipper appears in different locations throughout the night. • Apparent brightness of a star depends in part upon its distance from the Earth. Example: A flashlight beam appears brighter as it moves closer.	1
5.S	SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	2
5.S.1	Analyze various implications/effects of scientific advancement within the environment and society.	2
5.S.1.1	Students are able to identify scientific changes that have affected transportation, health, sanitation, and communication.	1
5.S.1.2	Students are able to describe how designing a solution may have constraints. Examples: costs, time, space, materials, and safety • Explain why the benefits of science and technology are not available to all people. • Describe the consumption of resources over time. Examples: oil, gold, and coal	2
5.S.2	Analyze the relationships/interactions among science, technology, environment, and society.	2
5.S.2.1	Students are able to explain the interrelationship of populations, resources, and environments. Example: human populations encroaching upon wildlife habitat Example: Technology such as fish finders affects fish population. • Define interrelationships. ? Describe conservation practices. Examples: crop rotation, shelter belts, fishing limits, hybrid automobiles	2

Table 8.14
Group Consensus
South Dakota Science Content Standards, Science, Grade 8

Level	Description	DOK
8.N	NATURE OF SCIENCE	3
8.N.1	Understand the nature and origin of scientific knowledge.	2
8.N.1.1	Students are able to differentiate among facts, predictions, theory, and law/principles in scientific investigations. • Define fact, predictions, theory, and law/principle. • Discuss how theory can become law. ? Evaluate important contributions to the advancement of science from people of differing cultures, genders, and ethnicity. Examples: Marie Curie-radiation, Hess, Galileo- astronomy, Kepler-astronomy, Newton-physics, Neil Tice-astronomy, Mendeleev-physics	2
8.N.2	Apply the skills necessary to conduct scientific investigations.	3
8.N.2.1	Students are able to design a replicable scientific investigation. • Use appropriate supportive technologies. • Assess the limits of accuracy inherent in a particular measuring device or procedure. • Control variables to test hypotheses by repeated trials and by identifying sources of experimental error. • Interpret data to justify predictions or conclusions. • Use research methods to investigate practical and/or personal scientific problems and questions. • Select appropriate scientific equipment and technologies for investigations and experiments. • Use proper safety procedures in all investigations. • Wear appropriate attire. ? Evaluate the benefits and potential of scientific investigations.	3
8.P	PHYSICAL SCIENCE	2
8.P.1	Describe structures and properties of, and changes in, matter.	2
8.P.1.1	Students are able to classify matter as elements, compounds, or mixtures. Example: Na and Cl are elements that, chemically combined, form salt (NaCl) (compound). Example: Salt and water form a mixture that can be physically separated. ? Formulas	2
8.P.1.2	Students are able to use the Periodic Table to compare and contrast families of elements and to classify elements as metals, metalloids, or non-metals. • Describe the relationship between the organization and the predictive nature of the Periodic Table. • Use the Bohr model to show the arrangement of the subatomic particles of atomic numbers 1 through 18. ? Compare and contrast other atomic models.	2
8.P.1.3	Students are able to compare properties of matter resulting from physical and chemical changes. Examples: weathering, burning, melting, acid rain ? Ionic/covalent bonding	2
8.E	EARTH/SPACE SCIENCE	2

Table 8.14
Group Consensus
South Dakota Science Content Standards, Science, Grade 8

Level	Description	DOK
8.E.1	Analyze the various structures and processes of the Earth system.	2
8.E.1.1	Students are able to identify and classify minerals and rocks. Examples: luster, streak, fracture/cleavage, hardness (Mohs Scale), specific gravity, color, magnetism, acid test, flame test, fluorescence • Rocks as sedimentary, igneous, or metamorphic. • Rock Cycle ? Law of Conservation of Energy and Matter • Minerals as carbonates (CO3) or Silicates (SiO2) ? Minerals as oxides, sulfides, halides, sulfates	2
8.E.1.2	Students are able to explain the role of plate tectonics in shaping Earth. • Plates boundaries • Volcanoes • Earthquakes • Seismic waves • Mountains • Convection currents in the mantle • Changes over time Examples: adaptations, extinction, geologic time (relative and absolute), extinct species, fossils, surface features	1
8.E.1.3	Students are able to explain the factors that create weather and the instruments and technologies that assess it. Examples: NOAA, AMS • Differentiate between climate and climate zones. Examples: air masses, fronts, pressure systems, Coriolis effect, wind systems, humidity, storms ? Effects of the ocean on weather ? Condensation ? Evaporation ? Cloud Formation	2
8.E.1.4	Students are able to examine the chemical and physical properties of the ocean to determine causes and effects of currents and waves. Examples: density, temperature, salinity ? El Niño ? Ocean zones ? Ocean floor features	2
8.E.1.5	Students are able to explain the impact of weathering and erosion on the Earth. • Soil formation • Deposition (deltas) • Land transformations (Grand Canyon) • Glaciation ? Use geospatial technologies to investigate natural phenomena. Examples: GPS, GIS, remote sensing	2
8.E.2	Analyze essential principles and ideas about the composition and structure of the universe.	2

Table 8.14
Group Consensus
South Dakota Science Content Standards, Science, Grade 8

Level	Description	DOK
8.E.2.1	Students are able to compare celestial bodies within the solar system using composition, size, and orbital motion. • Describe the composition of the Sun, the planets, asteroids, and comets. ? Use of spectroscopic analysis of celestial bodies ? Measurement in space ? Constellations ? Galaxies ? Life cycle of a star ? HR Diagram ? Law of Gravitation ? Big Bang Theory ? Doppler Effect	1
8.E.2.2	Students are able to differentiate the influences of the relative positions of the Earth, Moon, and Sun. • Lunar and solar eclipses, moon phases, tides, seasons	2
8.S	SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	3
8.S.1	Analyze various implications/effects of scientific advancement within the environment and society.	2
8.S.1.1	Students are able to describe how science and technology have been influenced by social needs, attitudes, and values. Examples: GPS, GIS, remote sensing, Corps of Engineers (dams), NOAA (weather satellites), NASA (earth and space exploration), USGS (mapping)	2
8.S.2	Analyze the relationships/interactions among science, technology, environment, and society.	3
8.S.2.1	Students are able, given a scenario, to offer solutions to problems created by human activity on the local, regional, or global environment. Examples: global warming, deforestation	3

Table 11.14
Group Consensus
SOUTH DAKOTA SCIENCE CONTENT STANDARDS, Science, Grade 11

Level	Description	DOK
9-12.N	NATURE OF SCIENCE	3
9-12.N.1	Understand the nature and origin of scientific knowledge.	3
9-12.N.1.1	Students are able to evaluate a scientific discovery to determine and describe how societal, cultural, and personal beliefs influence scientific investigations and interpretations. Examples: telescope, birth control pill, penicillin, electricity • Recognize scientific knowledge is not merely a set of static facts but is dynamic and affords the best current explanations. Examples: spontaneous generation, relativity, geologic time • Discuss how progress in science can be affected by social issues.	3
9-12.N.1.2	Students are able to describe the role of observation and evidence in the development and modification of hypotheses, theories, and laws. • Research, communicate, and support a scientific argument. • Recognize and analyze alternative explanations and models. • Evaluate the scientific accuracy of information relevant to a specific issue (pseudo-science).	3
9-12.N.2	Apply the skills necessary to conduct scientific investigations.	3
9-12.N.2.1	Students are able to apply science process skills to design and conduct student investigations. • Identify the questions and concepts to guide the development of hypotheses. • Analyze primary sources of information to guide the development of the procedure. • Select and use appropriate instruments to extend observations and measurements. • Revise explanations and models based on evidence and logic. • Use technology and mathematic skills to enhance investigations, communicate results, and defend conclusions. Examples: Computer-based data collection Graphical analysis and representation Use appropriate technology to display data (i.e. spreadsheets, PowerPoint, web).	3
9-12.N.2.2	Students are able to practice safe and effective laboratory techniques. • Handle hazardous materials properly. • Use safety equipment correctly. • Practice emergency procedure. • Wear appropriate attire. • Practice safe behaviors.	1
9-12.P	PHYSICAL SCIENCE	2
9-12.P.1	Describe structures and properties of, and changes in, matter	2
9-12.P.1.1	Students are able to use the Periodic Table to determine the atomic structure of elements, valence number, family relationships, and regions (metals, nonmetals, and metalloids). • Determine protons, neutrons, electrons, mass number, and atomic number from the Periodic Table. • Determine the number of valence electrons for elements in the main (s&p) blocks of the Periodic Table.	2

Table 11.14
Group Consensus
SOUTH DAKOTA SCIENCE CONTENT STANDARDS, Science, Grade 11

Level	Description	DOK
	• Identify the relative metallic character of an element based on its location on the Periodic Table.	
9-12.P.1.2	Students are able to describe ways that atoms combine. • Name and write formulas for binary ionic and covalent compounds. Example: sodium chloride (NaCl), carbon dioxide (CO2) • Compare the roles of electrons in covalent, ionic, and metallic bonding. • Discuss the special nature of carbon covalent bonds.	2
9-12.P.1.3	Students are able to predict whether reactions will speed up or slow down as conditions change. Examples: temperature, concentration, surface area, and catalysts	2
9-12.P.1.4	Students are able to balance chemical equations by applying the Law of Conservation of Matter. • Trace number of particles in diagrams and pictures of balanced equations. Example: Write out an equation with symbols: Mg + 2HCL ? MgCl2 + 2H2	2
9-12.P.1.5	Students are able to distinguish among chemical, physical, and nuclear changes. • Differentiate between physical and chemical properties used to describe matter. • Identify key indicators of chemical and physical changes. • Describe the effects of changing pressure, volume, or temperature upon gases. • Identify characteristics of a solution and factors that affect the rate of solution formation. • Explain the differences among nuclear, chemical, and physical changes at the atomic level. Examples: solute, solvent, concentrated, dilute, saturated, unsaturated, supersaturated Factors affecting rate: agitation, heating, particle size, pictures of particles	2
9-12.P.2	Analyze forces, their forms, and their effects on motions.	2
9-12.P.2.1	Students are able to apply concepts of distance and time to the quantitative relationships of motion using appropriate mathematical formulas, equations, and units. • Evaluate speed, velocity, and acceleration both qualitatively and quantitatively. Examples: Identify the sign (+,-, 0) of an object's acceleration based on velocity information. Predict whether an object speeds up, slows down, or maintains a constant speed based on the forces acting upon it. Calculate acceleration using the equation Aavg=?V/?t. • Given distance and time, calculate the velocity or speed of an object. • Create and interpret graphs of linear motion. Example: Given a velocity-time or a distance-time graph with different slopes, determine the motion of an object. • Distinguish between velocity and acceleration as related to force.	2
9-12.P.2.2	Students are able to predict motion of an object using Newton's Laws. • Describe how inertia is related to Newton's First Law. • Explain the effect of balanced and unbalanced forces.	2

Table 11.14
Group Consensus
SOUTH DAKOTA SCIENCE CONTENT STANDARDS, Science, Grade 11

Level	Description	DOK
	• Identify the forces at work on action/reaction pairs as distinguished from balanced forces. Examples: Draw a linear force diagram for the forces acting on an object in contact with another. Identify action/reaction pairs. • Explain how force, mass, and acceleration are related.	
9-12.P.2.3	Students are able to relate concepts of force, distance, and time to the quantitative relationships of work, energy, and power. • Apply appropriate mathematical formulas and equations to concepts using appropriate units. Examples: Calculate power given force, distance and time. Calculate work done on an object given force and distance.	2
9-12.P.3	Analyze interactions of energy and matter.	2
9-12.P.3.1	Students are able to describe the relationships among potential energy, kinetic energy, and work as applied to the Law of Conservation of Energy. • Describe how energy can be transferred and transformed to produce useful work. Examples: Diagram simple energy transfers, describing the objects and the forms of energy gained and lost. Use simple machines as an example of the transmission of energy. • Given the formulas, calculate the mechanical advantage and efficiency of selected systems. • Explain methods of heat transfer. Examples: conduction, radiation, and convection	2
9-12.P.3.2	Students are able to describe how characteristics of waves are related to one another. • Relate wavelength, speed, and frequency (v=?f). • Distinguish between transverse and longitudinal waves. Examples: Discuss changes in frequency of waves using the Doppler Effect. Compare the energy of different frequency ranges of waves with in the electromagnetic spectrum. Describe how different colors of light waves have different amounts of energy.	2
9-12.P.3.3	Students are able to describe electrical effects in terms of motion and concentrations of charged particles. • Relate potential difference to current. • Describe how static electricity is different from current electricity. • Interpret and apply Ohm's Law. • Describe electrical attractions and repulsions. • Describe how magnetism originates from motion of charged particles.	2
9-12.L	LIFE SCIENCE	2
9-12.L.1	Understand the fundamental structures, functions, classifications, and mechanisms found in living things.	2
9-	Students are able to relate cellular functions and processes to specialized structures	2

Table 11.14
Group Consensus
SOUTH DAKOTA SCIENCE CONTENT STANDARDS, Science, Grade 11

Level	Description	DOK
12.L.1.1	within cells. • Transport Examples: cell membrane, homeostasis • Photosynthesis and respiration Examples: ATP-ADP energy cycle Role of enzymes Mitochondria Chloroplasts • Storage and transfer of genetic information Examples: replication, transcription, and translation • Cell life cycles Examples: somatic cells (mitosis), germ cells (meiosis)	
9-12.L.1.2	Students are able to classify organisms using characteristics and evolutionary relationship of major taxa. • Kingdoms Examples: animals, plants, fungi, protista, monera • Phyla Examples: invertebrates, vertebrates, divisions of plants Note: There is an ongoing scientific debate about the number of groupings and which organisms should be included in each.	2
9-12.L.1.3	Students are able to identify structures and function relationships within major taxa. Examples: Relate how the layers in a leaf support leaf function. Interaction of agonist and antagonist muscles to support bone movement	1
9-12.L.2	Analyze various patterns and products of natural and induced biological change.	2
9-12.L.2.1	Students are able to predict inheritance patterns using a single allele. • Solve problems involving simple dominance, co-dominance, and sex-linked traits using Punnett squares for F1 and F2 generations. Examples: color blindness, wavy hair • Discuss disorders resulting from alteration of a single gene. Example: hemophilia, cystic fibrosis	2
9-12.L.2.2	Students are able to describe how genetic recombination, mutations, and natural selection lead to adaptations, evolution, extinction, or the emergence of new species. Examples: behavioral adaptations, environmental pressures, allele variations, bio-diversity • Use comparative anatomy to support evolutionary relationships.	2
9-12.L.3	Analyze how organisms are linked to one another and the environment.	3
9-12.L.3.1	Students are able to identify factors that can cause changes in stability of populations, communities, and ecosystems. • Define populations, communities, ecosystems, niches and symbiotic relationships. • Predict the results of biotic and abiotic interactions. Examples:	3

Table 11.14
Group Consensus
SOUTH DAKOTA SCIENCE CONTENT STANDARDS, Science, Grade 11

Level	Description	DOK
	Responses to changing of the seasons Tolerances (temperature, weather, climate) Dormancy and migration Fluctuation in available resources (water, food, shelter) Human activity Biogeochemical cycles Energy flow Cooperation and competition in ecosystems Response to external stimuli	
9-12.E	EARTH/SPACE SCIENCE	2
9-12.E.1	Analyze the various structures and processes of the Earth system.	2
9-12.E.1.1	. Students are able to explain how elements and compounds cycle between living and non-living systems. • Diagram and describe the N, C, O and H2O cycles. • Describe the importance of the N, C, O and H2O cycles to life on this planet. Examples: water cycle including evaporation, cloud formation, condensation.	2
9-12.E.1.2	Students are able to describe how atmospheric chemistry may affect global climate. Examples: Greenhouse Effect, ozone depletion, ocean's effects on weather	2
9-12.E.1.3	Students are able to assess how human activity has changed the land, ocean, and atmosphere of Earth. Examples: forest cover, chemical usage, farming, urban sprawl, grazing	2
9-12.E.2	Analyze essential principles and ideas about the composition and structure of the universe.	2
9-12.E.2.1	Students are able to recognize how Newtonian mechanics can be applied to the study of the motions of the solar system. • Given a set of possible explanations of orbital motion (revolution), identify those that make use of gravitational forces and inertia.	2
9-12.S	SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	3
9-12.S.1	Analyze various implications/effects of scientific advancement within the environment and society.	2
9-12.S.1.1	Students are able to explain ethical roles and responsibilities of scientists and scientific research. Examples: Sharing of data Accuracy of data Acknowledgement of sources Following laws Animal research Human research Managing hazardous materials and wastes	2
9-12.S.1.2	Students are able to evaluate and describe the impact of scientific discoveries on historical events and social, economic, and ethical issues. Examples: cloning, stem cells, gene splicing, nuclear power, patenting new life forms, emerging diseases, AIDS, resistant forms of bacteria, biological and chemical weapons,	2

Table 11.14
Group Consensus
SOUTH DAKOTA SCIENCE CONTENT STANDARDS, Science, Grade 11

Level	Description	DOK
	global warming, and alternative fuels	
9-12.S.2	Analyze the relationships/interactions among science, technology, environment, and society.	3
9-12.S.2.1	Students are able to describe immediate and long-term consequences of potential solutions for technological issues. Examples: environmental, communication, internet, entertainment, construction, manufacturing, power and transportation, energy sources, health technology, and biotechnology issues • Describe how the pertinent technological system operates. Example: waste management facility	3
9-12.S.2.2	Students are able to analyze factors that could limit technological design. Examples: ethics, environmental impact, manufacturing processes, operation, maintenance, replacement, disposal, and liability	3
9-12.S.2.3	Students are able to analyze and describe the benefits, limitations, cost, and consequences involved in using, conserving, or recycling resources. Examples: mining, agriculture, medicine, school science labs, forestry, energy, disposable diapers, computers, tires	3

Appendix B

Data Analysis Tables

South Dakota
Grades 5, 8, and 11
Science
2008

Brief Explanation of Data in the Alignment Tables by Column

Tables *grade*.1

Standards #	Number of standards plus one for a generic standard for each standard.
Standards #	Average number of standards for reviewers. If the number is greater than the actual number in the standard, then at least one reviewer coded an item for the standard/standard but did not find any standard in the standard that corresponded to the item.
Level	The Depth-of-Knowledge level coded by the reviewers for the standards for each standard.
# of standards by Level	The number of standards coded at each level
% w/in std by Level	The percent of standards coded at each level
Hits Mean & SD	Mean and standard deviation number of items reviewers coded as corresponding to standard. The total is the total number of coded hits.
Cat. Conc. Accept.	"Yes" indicates that the standard met the acceptable level for criterion. "Yes" if mean is six or more. "Weak" if mean is five to six. "No" if mean is less than five.

Tables *grade*.2

	First five columns repeat columns from Table 1.
Level of Item w.r.t. Stand	Mean percent and standard deviation of items coded as "under" the Depth-of-Knowledge level of the corresponding standard, as "at" (the same) the Depth-of-Knowledge level of the corresponding standard, and as "above" the Depth-of-Knowledge level of the corresponding standard.
Depth-of-Know. Consistency Accept.	"Yes" indicates that 50% or more of the items were rated as "at" or "above" the Depth-of-Knowledge level of the corresponding standards. "Weak" indicates that 40% to 50% of the items were rated as "at" or "above" the Depth-of-Knowledge level of the corresponding standards. "No" indicates that less than 40% items were rated as "at" or "above" the Depth-of-Knowledge level of the corresponding standards.

Tables *grade*.3

First five columns repeat columns from Table 1 and 2.

Range of Standards

Standards Hit — Average number and standard deviation of the standards hit coded by reviewers.

% of Total — Average percent and standard deviation of the total standards that had at least one item coded.

Range of Know.

Accept. — "Yes" indicates that 50% or more of the standards had at least one coded standard.
"Weak" indicates that 40% to 50% of the standards had at least one coded standard.
"No" indicates that 40% or less of the standards had at least one coded standard.

Balance Index

% Hits in Std/Ttl Hits — Average and standard deviation of the percent of the items hit for a standard of total number of hits (see total under the Hits column).

Index — Average and standard deviation of the Balance Index.

Note: BALANCE INDEX $1 - (\sum_{k=1} \left| 1/(O) - I_{(k)} /(H) \right|)/2$

Where O = Total number of standards hit for the standard
$I_{(k)}$ = Number of items hit corresponding to standard (k)
H = Total number of items hit for the standard

Bal. of Rep Accept. — "Yes" indicates that the Balance Index was .7 or above (items evenly distributed among standards).
"Weak" indicates that the Balance Index was .6 to .7 (a high percentage of items coded as corresponding to two or three standards).
"No" indicates that the Balance Index was .6 or less (a high percentage of items coded as corresponding to one standard.)

Tables *grade*.4

Summary if standard met the acceptable level for the four criteria by each standard.

Tables *grade*.6

The DOK value for each assessment item given by each reviewer. The intraclass correlation for the group of reviewers is given on the last row.

Tables *grade*.8

The DOK level and standard code assigned by each reviewer for each item.

Tables *grade*.9

This list for each item all of the standards coded by the group of reviewers as corresponding to the item. Repeat of a standard indicates the number of reviewers who coded that standard as corresponding to the item.

Tables *grade*.10

This lists for each standard all of the items coded by the group of reviewers as corresponding to the standard. Repeat of an item indicates the number of reviewers who coded the item as corresponding to the standard.

Tables *grade*.12

This table summarizes the number of reviewers who coded an item as corresponding to a standard. It contains the same information as in Table 10.

Tables *grade*.13

This table can be used to compare the DOK level of a standard to the average DOK level of the items reviewers assigned to the standard. This table is helpful to identify items with a lower DOK level that should be replaced by an item with a higher DOK level to improve the Depth-of-Knowledge Consistency.

Table 5.1
Categorical Concurrence Between Standards and Assessment as Rated by Seven Reviewers
South Dakota Science 2008 Grade 5
Number of Assessment Items - 70

Standards			Level by Objective			Hits		Cat. Concurr.
Title	Goals #	Objs #	Level	# of objs by Level	% w/in std by Level	Mean	S.D.	
5.1 - NATURE OF SCIENCE	2	2.14	1 3	1 1	50 50	0.57	0.90	NO
5.P - PHYSICAL SCIENCE	3	6.43	1 2	5 1	83 16	20.71	1.03	YES
5.L - LIFE SCIENCE	3	6.43	1 2	3 3	50 50	26.57	1.40	YES
5.E - EARTH/SPACE SCIENCE	2	3.14	1	3	100	13.71	0.45	YES
5.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	2	3.29	1 2	1 2	33 66	8.57	1.50	YES
Total	12	21.43	1 2 3	13 6 1	65 30 5	70.14	0.35	

Table 5.2a
Alternate Depth-of-Knowledge Consistency Between Standards and Assessment as Rated by Seven Reviewers (Does Not Assume Each Objective Should Have Equal Representation)
South Dakota Science 2008 Grade 5
Number of Assessment Items - 70

Standards			Hits		Level of Item w.r.t. Standard						DOK Consistency
					% Under		% At		% Above		
Title	Goals #	Objs #	M	S.D.	M	S.D.	M	S.D.	M	S.D.	
5.1 - NATURE OF SCIENCE	2	2.14	0.57	0.90	75	43	25	43	0	0	NO
5.P - PHYSICAL SCIENCE	3	6.43	20.71	1.03	15	101	58	37	27	36	YES
5.L - LIFE SCIENCE	3	6.43	26.57	1.40	26	160	62	31	13	18	YES
5.E - EARTH/SPACE SCIENCE	2	3.14	13.71	0.45	0	0	82	20	18	20	YES
5.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	2	3.29	8.57	1.50	18	56	67	36	14	31	YES
Total	12	21.43	70.14	0.35	21	34	60	35	20	28	

Table 5.3
Range-of-Knowledge Correspondence and Balance of Representation Between Standards and Assessment as Rated by Seven Reviewers
South Dakota Science 2008 Grade 5
Number of Assessment Items - 70

Standards			Hits		Range of Objectives				Rng. of Know.	Balance Index				Bal. of Represent.
					# Objs Hit		% of Total			% Hits in Std/Ttl Hits		Index		
Title	Goals #	Objs #	Mean	S.D.	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
5.1 - NATURE OF SCIENCE	2	2.14	0.57	0.90	0.57	0.90	24	33	NO	1	1	0.43	0.57	NO
5.P - PHYSICAL SCIENCE	3	6.43	20.71	1.03	6.43	0.49	100	0	YES	30	1	0.77	0.03	YES
5.L - LIFE SCIENCE	3	6.43	26.57	1.40	6.43	0.49	100	0	YES	38	2	0.82	0.02	YES
5.E - EARTH/SPACE SCIENCE	2	3.14	13.71	0.45	3.14	0.35	100	0	YES	20	1	0.92	0.05	YES
5.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	2	3.29	8.57	1.50	3.29	0.45	100	0	YES	12	2	0.85	0.06	YES
Total	12	21.43	70.14	0.35	3.97	1.90	85	13		20	12	0.76	0.08	

Table 5.4
Summary of Attainment of Acceptable Alignment Level on Four Content Focus Criteria as Rated by Seven Reviewers
South Dakota Science 2008 Grade 5
Number of Assessment Items - 70

Standards	Alignment Criteria			
	Categorical Concurrence	Depth-of-Knowledge Consistency	Range of Knowledge	Balance of Representation
5.1 - NATURE OF SCIENCE	NO	NO	NO	NO
5.P - PHYSICAL SCIENCE	YES	YES	YES	YES
5.L - LIFE SCIENCE	YES	YES	YES	YES
5.E - EARTH/SPACE SCIENCE	YES	YES	YES	YES
5.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	YES	YES	YES	YES

Table 5.6
Depth-of-Knowledge Levels by Item and Reviewers
Intraclass Correlation
South Dakota Science 2008 Grade 5

Item	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Rater 6	Rater 7
1	1	2	2	2	1	1	1
2	1	1	1	1	1	1	2
3	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1
5	2	2	2	2	2	2	2
6							
7							
8	1	1	1	1	1	1	1
9	2	2	2	2	2	1	1
10	2	3	2	2	2	2	2
11	2	1	2	1	1	1	1
12	2	3	2	2	2	2	1
13	1	1	1	1	1	1	1
14	2	2	2	2	2	2	2
15	1	1	2	2	1	2	1
16	2	2	2	2	2	2	1
17	1	1	1	1	1	1	1
18	1	1	1	1	1	2	1
19	1	2	2	2	2	1	1
20	1	2	2	2	2	1	1
21	1	2	1	1	1	1	1
22	1	1	1	1	1	1	1
23	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1
25	1	1	1	1	1	1	1
26	1	1	1	1	1	1	1
27	1	1	2	1	1	1	1
28	1	1	1	1	1	1	1
29	1	1	2	1	1	1	1
30	2	2	2	2	1	2	2
31	1	2	2	2	1	2	1
32	2	2	3	2	2	2	1
33	2	2	2	2	1	2	1
34	1	2	2	2	2	1	1
35	2	2	2	2	2	2	1
36	1	2	2	1	1	1	1
37	1	1	1	1	1	1	1
38	2	3	1	2	1	1	2
39	1	3	2	2	1	1	1
40	1	2	1	2	1	1	1

Table 5.6
Depth-of-Knowledge Levels by Item and Reviewers
Intraclass Correlation
South Dakota Science 2008 Grade 5

Item	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Rater 6	Rater 7
41	1	1	1	1	1	1	1
42							
43							
44							
45	1	2	2	2	1	1	1
46	1	1	1	1	1	1	1
47	1	1	1	1	1	1	1
48	2	2	2	2	2	1	1
49	1	1	1	1	1	1	2
50	1	1	1	1	1	1	1
51	1	2	2	2	1	1	1
52	1	2	1	1	1	1	1
53	2	2	2	2	2	1	1
54	2	2	2	1	2	1	1
55	1	2	1	2	1	1	1
56	2	2	2	2	1	2	1
57	1	2	2	1	1	1	1
58							
59							
60	1	2	1	1	2	1	1
61	1	2	2	1	1	1	1
62	1	1	1	2	1	1	1
63	1	1	1	2	1	1	1
64	1	1	1	1	1	1	1
65	1	2	2	1	1	2	1
66	1	2	2	2	1	1	1
67	1	1	1	2	1	1	1
68	1	1	2	1	1	1	1
69	2	1	2	1	1	2	1
70	1	1	1	1	1	1	1
71	2	2	3	3	2	1	1
72	1	2	2	2	1	1	1
73	1	1	1	1	1	1	1
74	1	1	1	1	1	1	1
75	1	2	2	2	1	1	1
76	1	2	2	1	1	1	1
77	2	2	2	1	2	2	1

Intraclass Correlation: 0.8262
Pairwise Comparison: 0.6837

Table 5.8
DOK Levels and Objectives Coded by Each Reviewer
South Dakota Science 2008 Grade 5

Item	DOK0	PObj0	DOK1	PObj1	DOK2	PObj2	S1Obj2	DOK3	PObj3	DOK4	PObj4	DOK5	PObj5	DOK6	PObj6
1	1	5.P.3.2	2	5.P.3.2	2	5.P.3.2		2	5.P.3.2	1	5.P.3.2	1	5.P.3.2	1	5.P.3.2
2	1	5.P.2.2	1	5.P.2.2	1	5.P.2.2		1	5.P.2.2	1	5.P.2	1	5.P.2.2	2	5.P.2.2
3	1	5.L.3.2	1	5.L.3.2	1	5.L.3.2		1	5.L.3.2	1	5.L.3.2	1	5.L.3.2	1	5.L.3.2
4	1	5.P.2.1	1	5.P.2.1	1	5.P.2.1		1	5.P.2.1	1	5.P.2.1	1	5.P.2.1	1	5.P.2.1
5	2	5.P.3.1	2	5.P.1.1	2	5.P.1.1		2	5.P.3.1	2	5.E.2.1	2	5.P.3.1	2	5.P.3.1
6															
7															
8	1	5.E.1.1	1	5.E.1.1	1	5.E.1.1		1	5.E.1.1	1	5.E.1.1	1	5.E.1.1	1	5.E.1.1
9	2	5.S.2.1	2	5.S.2.1	2	5.S.1.1		2	5.S.2.1	2	5.S.2.1	1	5.S.1.1	1	5.1.1
10	2	5.S.2.1	3	5.S.2.1	2	5.L.3.1		2	5.S.2.1	2	5.S.2.1	2	5.S.2.1	2	5.L.3.1
11	2	5.E.2.1	1	5.E.2.1	2	5.E.2.1		1	5.E.2.1	1	5.S.2.1	1	5.E.2.1	1	5.E.2.1
12	2	5.L.3.1	3	5.L.3.1	2	5.L.3.1		2	5.L.3.1	2	5.L.3.1	2	5.L.3.1	1	5.L.3.1
13	1	5.P.2.2	1	5.P.2.2	1	5.P.2.2		1	5.P.2.2	1	5.P.2.2	1	5.P.2.2	1	5.P.2.2
14	2	5.S.1.2	2	5.S.1.2	2	5.S.1.2		2	5.S.1.2	2	5.S.1.2	2	5.S.1.2	2	5.S.1.2
15	1	5.L.1.1	1	5.L.1.1	2	5.L.1.1		2	5.L.1.1	1	5.L.1.1	2	5.L.1.1	1	5.L.1.1
16	2	5.L.3.1	2	5.S.2.1	2	5.L.3.1		2	5.S.2.1	2	5.L.3.1	2	5.L.3.1	1	5.L.3.1
17	1	5.E.1.1	1	5.E.1.1	1	5.E.1.1		1	5.E.1.1	1	5.E.1.1	1	5.E.1.1	1	5.E.1.1
18	1	5.E.2.1	1	5.L.2.1	1	5.E.2		1	5.E.2.1	1	5.E.2.1	2	5.E.2.1	1	5.E.2.1
19	1	5.L.3.1	2	5.S.1.2	2	5.S.2.1		2	5.S.2.1	2	5.L.3.1	1	5.L.3.1	1	5.L.3.1
20	1	5.L.3.1	2	5.L.3.1	2	5.L.3.1		2	5.L.3.1	2	5.L.3.1	1	5.L.3.1	1	5.L.3.1
21	1	5.P.2.1	2	5.S.1.2	1	5.P.2.1		1	5.P.2.1	1	5.P.2.1	1	5.P.2.1	1	5.P.2.1
22	1	5.L.1.1	1	5.L.1.1	1	5.L.1.1		1	5.L.1.1	1	5.L.1.1	1	5.L.1.1	1	5.L.1.1
23	1	5.P.3.3	1	5.P.3.3	1	5.P.3.3		1	5.P.3.3	1	5.L.1.1	1	5.P.3.3	1	5.P.3.3
24	1	5.L.1.1	1	5.L.1.1	1	5.L.1.1		1	5.L.1.1	1	5.L.1.1	1	5.L.1.1	1	5.L.1.1
25	1	5.L.1.1	1	5.L.1.1	1	5.L.1.1		1	5.L.1.1	1	5.L.1.1	1	5.L.1.1	1	5.L.1.1
26	1	5.L.3.3	1	5.L.3.3	1	5.L.3.3		1	5.L.3.3	1	5.L.3.3	1	5.L.3.3	1	5.L.3.3
27	1	5.E.2.2	1	5.E.2.2	2	5.E.2.2		1	5.E.2.2	1	5.E.2.2	1	5.E.2.2	1	5.E.2.2
28	1	5.P.1.1	1	5.P.2.1	1	5.P.2.1		1	5.P.2.1	1	5.L.2.1	1	5.P.2.1	1	5.P.2.1
29	1	5.E.1.1	1	5.E.1.1	2	5.E.1.1		1	5.E.1.1	1	5.E.1.1	1	5.E.1.1	1	5.E.1.1
30	2	5.P.2.1	2	5.P.2.1	2	5.P.2.1		2	5.P.2.1	1	5.P.2.1	2	5.P.2.1	2	5.P.2.1
31	1	5.P.1	2	5.P.1.1	2	5.P.1.1		2	5.P.1.1	1	5.P.3.1	2	5.P.1.1	1	5.P.1.1
32	2	5.L.3.1	2	5.L.3.1	3	5.L.3.1		2	5.L.3.1	2	5.L.3.1	2	5.L.3.1	1	5.L.3.1
33	2	5.L.3.3	2	5.L.3.3	2	5.L.3.3		2	5.L.3.3	1	5.L.3.3	2	5.L.3.3	1	5.L.3.3
34	1	5.S.1.1	2	5.S.1.1	2	5.S.1.1		2	5.S.1.1	2	5.S.1.1	1	5.S.1.1	1	5.S.1.1
35	2	5.L.3.2	2	5.L.3.2	2	5.L.3.2		2	5.L.3.1	2	5.L.3.2	2	5.L.3.2	1	5.L.3.2
36	1	5.E.2.1	2	5.E.2.1	2	5.E.2.1		1	5.E.2.1	1	5.E.2.1	1	5.E.2.1	1	5.E.2.1
37	1	5.L.2.1	1	5.L.2.1	1	5.L.2.1		1	5.L.2.1	1	5.L.2.1	1	5.L.2.1	1	5.L.2.1
38	2	5.S.1.2	3	5.S.1.2	1	5.S.1.1		2	5.S.1.2	1	5.P.2	1	5.P.2	2	5.S.1.2

Table 5.8
DOK Levels and Objectives Coded by Each Reviewer
South Dakota Science 2008 Grade 5

Item	DOK0	PObj0	DOK1	PObj1	DOK2	PObj2	S1Obj2	DOK3	PObj3	DOK4	PObj4	DOK5	PObj5	DOK6	PObj6
39	1	5.S.1.2	3	5.P.3.1	2	5.S.1		2	5.S.1.2	1	5.S.1.2	1	5.S.1.2	1	5.S.1.2
40	1	5.L.2.2	2	5.L.2.2	1	5.L.2.2		2	5.L.2.2	1	5.P.2.2	1	5.L.2.2	1	5.L.2.2
41	1	5.L.2.2	1	5.L.2.2	1	5.L.2.2		1	5.L.2.2	1	5.L.2.2	1	5.L.2.2	1	5.L.2.2
42															
43															
44															
45	1	5.P.1.1	2	5.P.1.1	2	5.P.1.1		2	5.P.1.1	1	5.P.1.1	1	5.P.1.1	1	5.P.1.1
46	1	5.E.1.1	1	5.E.1.1	1	5.E.1.1		1	5.E.1.1	1	5.E.1.1	1	5.E.1.1	1	5.E.1.1
47	1	5.P.1.1	1	5.P.1.1	1	5.P.1.1		1	5.P.1.1	1	5.P.1.1	1	5.P.1.1	1	5.P.1.1
48	2	5.L.2.2	2	5.L.2.2	2	5.L.2.2		2	5.L.2.2	2	5.L.2.2	1	5.L.2.2	1	5.L.2.2
49	1	5.L.3.2	1	5.L.3.2	1	5.L.3.2		1	5.L.3.2	1	5.L.3.2	1	5.L.3.2	2	5.L.3.2
50	1	5.P.3.3	1	5.P.3.3	1	5.P.3.3		1	5.P.3.3	1	5.P.3.3	1	5.P.3.3	1	5.P.3.3
51	1	5.E.2.2	2	5.E.2.1	2	5.E.2.2	5.P.3.3	2	5.P.3.3	1	5.E.2.2	1	5.E.2.2	1	5.E.2.2
52	1	5.E.2.2	2	5.E.2.2	1	5.E.2.2		1	5.E.2.2	1	5.E.2.2	1	5.E.2.2	1	5.E.2.2
53	2	5.1.2.1	2	5.P.3.1	2	5.P.3.1		2	5.P.3.1	2	5.P.3.1	1	5.P.3.1	1	5.1.2.1
54	2	5.P.1.1	2	5.P.1.1	2	5.1.2.1		1	5.P.1.1	2	5.P.1.1	1	5.P.1.1	1	5.P.1.1
55	1	5.E.2.2	2	5.E.2.2	1	5.E.2.2		2	5.E.2.2	1	5.E.2.2	1	5.E.2.2	1	5.E.2.2
56	2	5.P.2.2	2	5.P.2.2	2	5.P.2.2		2	5.P.2.2	1	5.P.2.1	2	5.P.2.2	1	5.P.2.2
57	1	5.P.2.1	2	5.P.2.1	2	5.P.2.1		1	5.P.2.1	1	5.P.2.1	1	5.P.2.1	1	5.P.2.1
58															
59															
60	1	5.S.1.1	2	5.S.1.2	1	5.S.1.1		1	5.S.1.2	2	5.S.1.1	1	5.S.1.1	1	5.S.2.1
61	1	5.L.1.1	2	5.L.1.1	2	5.L.1.1		1	5.L.1.1	1	5.L.1.1	1	5.L.1.1	1	5.L.1.1
62	1	5.L.1.1	1	5.L.1.1	1	5.L.1.1		2	5.L.1.1	1	5.L.1.1	1	5.L.1.1	1	5.L.1.1
63	1	5.L.3.3	1	5.L.3	1	5.L.3		2	5.L.3.1	1	5.L.3.1	1	5.L.3	1	5.L.3.3
64	1	5.E.2.1	1	5.E.2.1	1	5.E.2.1		1	5.E.2.1	1	5.E.2.1	1	5.E.2.1	1	5.E.2.1
65	1	5.P.1.1	2	5.P.1.1	2	5.P.1.1		1	5.P.1.1	1	5.P.1.1	2	5.P.1.1	1	5.P.1.1
66	1	5.S.1.1	2	5.S.1.1	2	5.S.2.1		2	5.S.1.1	1	5.S.1.1	1	5.S.1	1	5.S.1.1
67	1	5.P.3.2	1	5.P.3.2	1	5.P.3.2		2	5.P.3.1	1	5.P.3.3	1	5.P.3.2	1	5.P.3.3
68	1	5.L.3.1	1	5.S.2.1	2	5.S.2.1		1	5.L.3.1	1	5.L.3.1	1	5.S.2.1	1	5.L.3.1
69	2	5.P.2.2	1	5.P.2.2	2	5.P.2.2		1	5.P.2.2	1	5.L.2.2	2	5.P.2.2	1	5.P.2.2
70	1	5.L.2.2	1	5.L.2.2	1	5.L.2.2		1	5.L.2.2	1	5.L.2.2	1	5.L.2.2	1	5.L.2.2
71	2	5.L.2.1	2	5.L.2.1	3	5.L.2.1		3	5.L.2.1	2	5.L.2.1	1	5.L.2.1	1	5.L.2.1
72	1	5.E.1.1	2	5.E.1.1	2	5.E.1.1		2	5.E.1.1	1	5.E.1.1	1	5.E.1.1	1	5.E.1.1
73	1	5.E.2.1	1	5.E.2.1	1	5.E.2.1		1	5.E.2.1	1	5.E.2.2	1	5.E.2.1	1	5.E.2.1
74	1	5.L.1.1	1	5.L.1.1	1	5.L.1.1		1	5.L.1.1	1	5.L.1.1	1	5.L.1.1	1	5.L.1.1
75	1	5.P.1.1	2	5.P.1.1	2	5.P.2.1		2	5.P.2.1	1	5.P.2.1	1	5.P.2	1	5.P.1.1
76	1	5.L.3.2	2	5.L.3.2	2	5.L.3.2		1	5.L.3.2	1	5.L.3.2	1	5.L.3.2	1	5.L.3.2

Table 5.8
DOK Levels and Objectives Coded by Each Reviewer
South Dakota Science 2008 Grade 5

Item	DOK0	PObj0	DOK1	PObj1	DOK2	PObj2	S1Obj2	DOK3	PObj3	DOK4	PObj4	DOK5	PObj5	DOK6	PObj6
77	2	5.L.2.1	2	5.L.2.1	2	5.L.2.1		1	5.L.2.1	2	5.L.2.1	2	5.L.2.1	1	5.L.2.1

Objective Pairwise Comparison: 0.8049
Standard Pairwise Comparison: 0.9045

Table 5.9
Objectives Coded to Each Item by Reviewers
South Dakota Science 2008 Grade 5

Low		Medium		High
0		6.376623		8

1 3503392	5.P.3.2	5.P.3.2	5.P.3.2	5.P.3.2	5.P.3.2	5.P.3.2	5.P.3.2
2 3505576	5.P.2	5.P.2.2	5.P.2.2	5.P.2.2	5.P.2.2	5.P.2.2	5.P.2.2
3 3503412	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2
4 3503408	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1
5 3505580	5.P.1.1	5.P.1.1	5.P.3.1	5.P.3.1	5.P.3.1	5.P.3.1	5.E.2.1
6							
7							
8 3503388	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1
9 3505566	5.1.1	5.S.1.1	5.S.1.1	5.S.2.1	5.S.2.1	5.S.2.1	5.S.2.1
10 3505591	5.L.3.1	5.L.3.1	5.S.2.1	5.S.2.1	5.S.2.1	5.S.2.1	5.S.2.1
11 3503380	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1	5.S.2.1
12 3522036	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1
13 3503394	5.P.2.2	5.P.2.2	5.P.2.2	5.P.2.2	5.P.2.2	5.P.2.2	5.P.2.2
14 3505257	5.S.1.2	5.S.1.2	5.S.1.2	5.S.1.2	5.S.1.2	5.S.1.2	5.S.1.2
15 3521997	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1
16 3516707	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1	5.S.2.1	5.S.2.1
17 3522048	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1
18 3506880	5.L.2.1	5.E.2	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1
19 3503399	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1	5.S.1.2	5.S.2.1	5.S.2.1
20 3503259	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1
21 3505573	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	5.S.1.2
22 3503414	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1
23 3516692	5.P.3.3	5.P.3.3	5.P.3.3	5.P.3.3	5.P.3.3	5.P.3.3	5.L.1.1
24 3503379	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1
25 3506883	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1
26 3505577	5.L.3.3	5.L.3.3	5.L.3.3	5.L.3.3	5.L.3.3	5.L.3.3	5.L.3.3
27 3503270	5.E.2.2	5.E.2.2	5.E.2.2	5.E.2.2	5.E.2.2	5.E.2.2	5.E.2.2
28 3522063	5.P.1.1	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	5.L.2.1
29 3516704	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1
30 3522100	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1
31 3503415	5.P.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.3.1
32 3522116	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1
33 3522097	5.L.3.3	5.L.3.3	5.L.3.3	5.L.3.3	5.L.3.3	5.L.3.3	5.L.3.3
34 3521979	5.S.1.1	5.S.1.1	5.S.1.1	5.S.1.1	5.S.1.1	5.S.1.1	5.S.1.1
35 3522053	5.L.3.1	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2
36 3505251	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1
37 3503410	5.L.2.1	5.L.2.1	5.L.2.1	5.L.2.1	5.L.2.1	5.L.2.1	5.L.2.1
38 3516706	5.P.2	5.P.2	5.S.1.1	5.S.1.2	5.S.1.2	5.S.1.2	5.S.1.2

Table 5.9
Objectives Coded to Each Item by Reviewers
South Dakota Science 2008 Grade 5

39 3503387	5.P.3.1	5.S.1	5.S.1.2	5.S.1.2	5.S.1.2	5.S.1.2	5.S.1.2	
40 3506364	5.P.2.2	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	
41 3505579	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	
42								
43								
44								
45 3516688	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	
46 3522024	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	
47 3503409	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	
48 3521962	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	
49 3505558	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2	
50 3522069	5.P.3.3	5.P.3.3	5.P.3.3	5.P.3.3	5.P.3.3	5.P.3.3	5.P.3.3	
51 3522028	5.P.3.3	5.P.3.3	5.E.2.1	5.E.2.2	5.E.2.2	5.E.2.2	5.E.2.2	5.E.2.2
52 3521976	5.E.2.2	5.E.2.2	5.E.2.2	5.E.2.2	5.E.2.2	5.E.2.2	5.E.2.2	
53 3503390	5.1.2.1	5.1.2.1	5.P.3.1	5.P.3.1	5.P.3.1	5.P.3.1	5.P.3.1	
54 3516686	5.1.2.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	
55 3522073	5.E.2.2	5.E.2.2	5.E.2.2	5.E.2.2	5.E.2.2	5.E.2.2	5.E.2.2	
56 3522039	5.P.2.1	5.P.2.2	5.P.2.2	5.P.2.2	5.P.2.2	5.P.2.2	5.P.2.2	
57 3505225	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	5.P.2.1	
58								
59								
60 3503402	5.S.1.1	5.S.1.1	5.S.1.1	5.S.1.1	5.S.1.2	5.S.1.2	5.S.2.1	
61 3516702	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	
62 3522011	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	
63 3521994	5.L.3	5.L.3	5.L.3	5.L.3.1	5.L.3.1	5.L.3.3	5.L.3.3	
64 3503381	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1	
65 3506371	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	5.P.1.1	
66 3503273	5.S.1	5.S.1.1	5.S.1.1	5.S.1.1	5.S.1.1	5.S.1.1	5.S.2.1	
67 3505556	5.P.3.1	5.P.3.2	5.P.3.2	5.P.3.2	5.P.3.2	5.P.3.3	5.P.3.3	
68 3503277	5.L.3.1	5.L.3.1	5.L.3.1	5.L.3.1	5.S.2.1	5.S.2.1	5.S.2.1	
69 3503395	5.P.2.2	5.P.2.2	5.P.2.2	5.P.2.2	5.P.2.2	5.P.2.2	5.L.2.2	
70 3503384	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	5.L.2.2	
71 3522088	5.L.2.1	5.L.2.1	5.L.2.1	5.L.2.1	5.L.2.1	5.L.2.1	5.L.2.1	
72 3506365	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	5.E.1.1	
73 3522046	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.1	5.E.2.2	
74 3503252	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	5.L.1.1	
75 3522087	5.P.1.1	5.P.1.1	5.P.1.1	5.P.2	5.P.2.1	5.P.2.1	5.P.2.1	
76 3503411	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2	5.L.3.2	
77 3521960	5.L.2.1	5.L.2.1	5.L.2.1	5.L.2.1	5.L.2.1	5.L.2.1	5.L.2.1	

Table 5.10
Items Coded by Reviewers to Each Objective
South Dakota Science 2008 Grade 5

Low		Medium		High
0		12.92105		50

5.1																				
5.1.1	9																			
5.1.1.1																				
5.1.2																				
5.1.2.1	53	53	54																	
5.P																				
5.P.1	31																			
5.P.1.1	5	5	28	31	31	31	31	31	45	45	45	45	45	45	45	47	47	47	47	47
	47	47	54	54	54	54	54	54	65	65	65	65	65	65	65	75	75	75		
5.P.2	2	38	38	75																
5.P.2.1	4	4	4	4	4	4	4	21	21	21	21	21	21	28	28	28	28	28	30	30
	30	30	30	30	30	56	57	57	57	57	57	57	57	75	75	75				
5.P.2.2	2	2	2	2	2	2	13	13	13	13	13	13	13	40	56	56	56	56	56	56
	69	69	69	69	69	69														
5.P.3																				
5.P.3.1	5	5	5	5	31	39	53	53	53	53	53	67								
5.P.3.2	1	1	1	1	1	1	1	67	67	67	67									
5.P.3.3	23	23	23	23	23	23	50	50	50	50	50	50	50	51	51	67	67			
5.L																				
5.L.1																				
5.L.1.1	15	15	15	15	15	15	15	22	22	22	22	22	22	22	23	24	24	24	24	24
	24	24	25	25	25	25	25	25	25	61	61	61	61	61	61	62	62	62		
	62	62	62	62	74	74	74	74	74	74	74									

Table 5.10
Items Coded by Reviewers to Each Objective
South Dakota Science 2008 Grade 5

5.L.2																				
5.L.2.1	18	28	37	37	37	37	37	37	37	71	71	71	71	71	71	71	77	77	77	77
	77	77	77																	
5.L.2.2	40	40	40	40	40	40	41	41	41	41	41	41	41	48	48	48	48	48	48	48
	69	70	70	70	70	70	70	70												
5.L.3	63	63	63																	
5.L.3.1	10	10	12	12	12	12	12	12	12	16	16	16	16	16	19	19	19	19	20	20
	20	20	20	20	20	32	32	32	32	32	32	32	35	63	63	68	68	68	68	
5.L.3.2	3	3	3	3	3	3	3	35	35	35	35	35	35	49	49	49	49	49	49	49
	76	76	76	76	76	76	76													
5.L.3.3	26	26	26	26	26	26	26	33	33	33	33	33	33	33	63	63				
5.E																				
5.E.1																				
5.E.1.1	8	8	8	8	8	8	8	17	17	17	17	17	17	17	29	29	29	29	29	29
	29	46	46	46	46	46	46	46	72	72	72	72	72	72	72					
5.E.2	18																			
5.E.2.1	5	11	11	11	11	11	11	18	18	18	18	18	36	36	36	36	36	36	36	51
	64	64	64	64	64	64	64	73	73	73	73	73	73							
5.E.2.2	27	27	27	27	27	27	27	51	51	51	51	51	52	52	52	52	52	52	52	55
	55	55	55	55	55	55	73													
5.S																				
5.S.1	39	66																		
5.S.1.1	9	9	34	34	34	34	34	34	34	38	60	60	60	60	66	66	66	66	66	

Table 5.10
Items Coded by Reviewers to Each Objective
South Dakota Science 2008 Grade 5

5.S.1.2	14	14	14	14	14	14	14	19	21	38	38	38	38	39	39	39	39	39	60	60
5.S.2																				
5.S.2.1	9	9	9	9	10	10	10	10	10	11	16	16	19	19	60	66	68	68	68	

Table 5.11

Number of Reviewers Coding an Item by Objective (Item Number: Number of Reviewers)

South Dakota Science 2008 Grade 5

Low		Medium		High
1		3		7

5.1								
5.1.1	9:1							
5.1.1.1								
5.1.2								
5.1.2.1	53:2	54:1						
5.P								
5.P.1	31:1							
5.P.1.1	5:2	28:1	31:5	45:7	47:7	54:6	65:7	75:3
5.P.2	2:1	38:2	75:1					
5.P.2.1	4:7	21:6	28:5	30:7	56:1	57:7	75:3	
5.P.2.2	2:6	13:7	40:1	56:6	69:6			
5.P.3								
5.P.3.1	5:4	31:1	39:1	53:5	67:1			
5.P.3.2	1:7	67:4						
5.P.3.3	23:6	50:7	51:2	67:2				
5.L								
5.L.1								
5.L.1.1	15:7	22:7	23:1	24:7	25:7	61:7	62:7	74:7
5.L.2								
5.L.2.1	18:1	28:1	37:7	71:7	77:7			
5.L.2.2	40:6	41:7	48:7	69:1	70:7			
5.L.3	63:3							
5.L.3.1	10:2	12:7	16:5	19:4	20:7	32:7	35:1	63:2	68:4
5.L.3.2	3:7	35:6	49:7	76:7				
5.L.3.3	26:7	33:7	63:2					
5.E								
5.E.1								
5.E.1.1	8:7	17:7	29:7	46:7	72:7			
5.E.2	18:1							
5.E.2.1	5:1	11:6	18:5	36:7	51:1	64:7	73:6	
5.E.2.2	27:7	51:5	52:7	55:7	73:1			
5.S								
5.S.1	39:1	66:1						
5.S.1.1	9:2	34:7	38:1	60:4	66:5			
5.S.1.2	14:7	19:1	21:1	38:4	39:5	60:2		
5.S.2								
5.S.2.1	9:4	10:5	11:1	16:2	19:2	60:1	66:1	68:3

Table 5.12
Number of Reviewers Coding an Objective by Item (Objective: Number of Reviewers)
South Dakota Science 2008 Grade 5

Low		Medium		High
1		3		7

1 3503392	5.P.3.2:7		
2 3505576	5.P.2:1	5.P.2.2:6	
3 3503412	5.L.3.2:7		
4 3503408	5.P.2.1:7		
5 3505580	5.P.1.1:2	5.P.3.1:4	5.E.2.1:1
6			
7			
8 3503388	5.E.1.1:7		
9 3505566	5.1.1:1	5.S.1.1:2	5.S.2.1:4
10 3505591	5.L.3.1:2	5.S.2.1:5	
11 3503380	5.E.2.1:6	5.S.2.1:1	
12 3522036	5.L.3.1:7		
13 3503394	5.P.2.2:7		
14 3505257	5.S.1.2:7		
15 3521997	5.L.1.1:7		
16 3516707	5.L.3.1:5	5.S.2.1:2	
17 3522048	5.E.1.1:7		
18 3506880	5.L.2.1:1	5.E.2:1	5.E.2.1:5
19 3503399	5.L.3.1:4	5.S.1.2:1	5.S.2.1:2
20 3503259	5.L.3.1:7		
21 3505573	5.P.2.1:6	5.S.1.2:1	
22 3503414	5.L.1.1:7		
23 3516692	5.P.3.3:6	5.L.1.1:1	
24 3503379	5.L.1.1:7		
25 3506883	5.L.1.1:7		
26 3505577	5.L.3.3:7		
27 3503270	5.E.2.2:7		
28 3522063	5.P.1.1:1	5.P.2.1:5	5.L.2.1:1
29 3516704	5.E.1.1:7		
30 3522100	5.P.2.1:7		
31 3503415	5.P.1:1	5.P.1.1:5	5.P.3.1:1
32 3522116	5.L.3.1:7		
33 3522097	5.L.3.3:7		
34 3521979	5.S.1.1:7		
35 3522053	5.L.3.1:1	5.L.3.2:6	
36 3505251	5.E.2.1:7		
37 3503410	5.L.2.1:7		
38 3516706	5.P.2:2	5.S.1.1:1	5.S.1.2:4

Table 5.12
Number of Reviewers Coding an Objective by Item (Objective: Number of Reviewers)
South Dakota Science 2008 Grade 5

39 3503387	5.P.3.1:1	5.S.1:1	5.S.1.2:5
40 3506364	5.P.2.2:1	5.L.2.2:6	
41 3505579	5.L.2.2:7		
42			
43			
44			
45 3516688	5.P.1.1:7		
46 3522024	5.E.1.1:7		
47 3503409	5.P.1.1:7		
48 3521962	5.L.2.2:7		
49 3505558	5.L.3.2:7		
50 3522069	5.P.3.3:7		
51 3522028	5.P.3.3:2	5.E.2.1:1	5.E.2.2:5
52 3521976	5.E.2.2:7		
53 3503390	5.1.2.1:2	5.P.3.1:5	
54 3516686	5.1.2.1:1	5.P.1.1:6	
55 3522073	5.E.2.2:7		
56 3522039	5.P.2.1:1	5.P.2.2:6	
57 3505225	5.P.2.1:7		
58			
59			
60 3503402	5.S.1.1:4	5.S.1.2:2	5.S.2.1:1
61 3516702	5.L.1.1:7		
62 3522011	5.L.1.1:7		
63 3521994	5.L.3:3	5.L.3.1:2	5.L.3.3:2
64 3503381	5.E.2.1:7		
65 3506371	5.P.1.1:7		
66 3503273	5.S.1:1	5.S.1.1:5	5.S.2.1:1
67 3505556	5.P.3.1:1	5.P.3.2:4	5.P.3.3:2
68 3503277	5.L.3.1:4	5.S.2.1:3	
69 3503395	5.P.2.2:6	5.L.2.2:1	
70 3503384	5.L.2.2:7		
71 3522088	5.L.2.1:7		
72 3506365	5.E.1.1:7		
73 3522046	5.E.2.1:6	5.E.2.2:1	
74 3503252	5.L.1.1:7		
75 3522087	5.P.1.1:3	5.P.2:1	5.P.2.1:3
76 3503411	5.L.3.2:7		
77 3521960	5.L.2.1:7		

Table 5.13
Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])
South Dakota Science 2008 Grade 5

Low DOK		Matched DOK		High DOK
1		3		7

5.1 [3]:								
5.1.1 [1]:	9:1[1]							
5.1.1.1 [1]:								
5.1.2 [3]:								
5.1.2.1 [3]:	53:2 [1.5]	54:1 [2]						
5.P [1]:								
5.P.1 [1]:	31:1 [1]							
5.P.1.1 [1]:	5:2[2]	28:1 [1]	31:5 [1.8]	45:7 [1.43]	47:7 [1]	54:6 [1.5]	65:7 [1.43]	75:3 [1.33]
5.P.2 [2]:	2:1[1]	38:2 [1]	75:1 [1]					
5.P.2.1 [1]:	4:7[1]	21:6 [1]	28:5 [1]	30:7 [1.86]	56:1 [1]	57:7 [1.29]	75:3 [1.67]	
5.P.2.2 [2]:	2:6[1.17]	13:7 [1]	40:1 [1]	56:6 [1.83]	69:6 [1.5]			
5.P.3 [1]:								
5.P.3.1 [1]:	5:4[2]	31:1 [1]	39:1 [3]	53:5 [1.8]	67:1 [2]			
5.P.3.2 [1]:	1:7[1.43]	67:4 [1]						

Table 5.13

Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])

South Dakota Science 2008 Grade 5

5.P.3.3 [1]:	23:6 [1]	50:7 [1]	51:2 [2]	67:2 [1]					
5.L [2]:									
5.L.1 [1]:									
5.L.1.1 [1]:	15:7 [1.43]	22:7 [1]	23:1 [1]	24:7 [1]	25:7 [1]	61:7 [1.29]	62:7 [1.14]	74:7 [1]	
5.L.2 [2]:									
5.L.2.1 [2]:	18:1 [1]	28:1 [1]	37:7 [1]	71:7 [2]	77:7 [1.71]				
5.L.2.2 [1]:	40:6 [1.33]	41:7 [1]	48:7 [1.71]	69:1 [1]	70:7 [1]				
5.L.3 [2]:	63:3 [1]								
5.L.3.1 [2]:	10:2 [2]	12:7 [2]	16:5 [1.8]	19:4 [1.25]	20:7 [1.57]	32:7 [2]	35:1 [2]	63:2 [1.5]	68:4 [1]
5.L.3.2 [2]:	3:7[1]	35:6 [1.83]	49:7 [1.14]	76:7 [1.29]					
5.L.3.3 [1]:	26:7 [1]	33:7 [1.71]	63:2 [1]						
5.E [1]:									
5.E.1 [1]:									
5.E.1.1 [1]:	8:7[1]	17:7 [1]	29:7 [1.14]	46:7 [1]	72:7 [1.43]				
5.E.2 [1]:	18:1 [1]								

Table 5.13

Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])

South Dakota Science 2008 Grade 5

5.E.2.1 [1]:	5:1[2]	11:6 [1.33]	18:5 [1.2]	36:7 [1.29]	51:1 [2]	64:7 [1]	73:6 [1]	
5.E.2.2 [1]:	27:7 [1.14]	51:5 [1.2]	52:7 [1.14]	55:7 [1.29]	73:1 [1]			
5.S [2]:								
5.S.1 [2]:	39:1 [2]	66:1 [1]						
5.S.1.1 [1]:	9:2[1.5]	34:7 [1.57]	38:1 [1]	60:4 [1.25]	66:5 [1.4]			
5.S.1.2 [2]:	14:7 [2]	19:1 [2]	21:1 [2]	38:4 [2.25]	39:5 [1.2]	60:2 [1.5]		
5.S.2 [2]:								
5.S.2.1 [2]:	9:4[2]	10:5 [2.2]	11:1 [1]	16:2 [2]	19:2 [2]	60:1 [1]	66:1 [2]	68:3 [1.33]

Table 8.1
Categorical Concurrence Between Standards and Assessment as Rated by Seven Reviewers
South Dakota Science 2008 Grade 8
Number of Assessment Items - 70

Standards			Level by Objective			Hits		Cat. Concurr.
Title	Goals #	Objs #	Level	# of objs by Level	% w/in std by Level	Mean	S.D.	
8.N - NATURE OF SCIENCE	2	2	2 3	1 1	50 50	13.71	0.70	YES
8.P - PHYSICAL SCIENCE	1	3	2	3	100	13.43	0.73	YES
8.E - EARTH/SPACE SCIENCE	2	7.14	1 2	2 5	28 71	29.57	1.59	YES
8.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	2	2.29	2 3	1 1	50 50	13.71	0.45	YES
Total	7	14.43	1 2 3	2 10 2	14 71 14	70.43	1.05	

Table 8.2a
Alternate Depth-of-Knowledge Consistency Between Standards and Assessment as Rated by Seven Reviewers (Does Not Assume Each Objective Should Have Equal Representation)
South Dakota Science 2008 Grade 8
Number of Assessment Items - 70

Standards			Hits		Level of Item w.r.t. Standard						DOK Consistency
					% Under		% At		% Above		
Title	Goals #	Objs #	M	S.D.	M	S.D.	M	S.D.	M	S.D.	
8.N - NATURE OF SCIENCE	2	2	13.71	0.70	83	519	17	21	0	0	NO
8.P - PHYSICAL SCIENCE	1	3	13.43	0.73	76	291	23	20	1	5	NO
8.E - EARTH/SPACE SCIENCE	2	7.14	29.57	1.59	40	193	49	29	11	21	YES
8.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	2	2.29	13.71	0.45	74	459	26	34	0	0	NO
Total	7	14.43	70.43	1.05	58	36	36	30	6	16	

Table 8.3
Range-of-Knowledge Correspondence and Balance of Representation Between Standards and Assessment as Rated by Seven Reviewers
South Dakota Science 2008 Grade 8
Number of Assessment Items - 70

Standards			Hits		Range of Objectives				Rng. of Know.	Balance Index				Bal. of Represent.
					# Objs Hit		% of Total			% Hits in Std/Ttl Hits		Index		
Title	Goals #	Objs #	Mean	S.D.	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
8.N - NATURE OF SCIENCE	2	2	13.71	0.70	2	0	100	0	YES	19	1	0.97	0.04	YES
8.P - PHYSICAL SCIENCE	1	3	13.43	0.73	3	0	100	0	YES	19	1	0.95	0.01	YES
8.E - EARTH/SPACE SCIENCE	2	7.14	29.57	1.59	7.14	0.35	100	0	YES	42	2	0.93	0.04	YES
8.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	2	2.29	13.71	0.45	2.29	0.45	100	0	YES	19	1	0.88	0.10	YES
Total	7	14.43	70.43	1.05	3.61	2.09	100	0		25	10	0.93	0.06	

Table 8.4
Summary of Attainment of Acceptable Alignment Level on Four Content Focus Criteria as Rated by Seven Reviewers
South Dakota Science 2008 Grade 8
Number of Assessment Items - 70

Standards	Alignment Criteria			
	Categorical Concurrence	Depth-of-Knowledge Consistency	Range of Knowledge	Balance of Representation
8.N - NATURE OF SCIENCE	YES	NO	YES	YES
8.P - PHYSICAL SCIENCE	YES	NO	YES	YES
8.E - EARTH/SPACE SCIENCE	YES	YES	YES	YES
8.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	YES	NO	YES	YES

Table 8.6
Depth-of-Knowledge Levels by Item and Reviewers
Intraclass Correlation
South Dakota Science 2008 Grade 8

Item	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Rater 6	Rater 7
1	2	2	2	1	1	1	1
2	1	1	1	1	1	1	1
3	2	2	3	2	2	2	1
4	1	2	2	1	2	2	1
5	1	2	2	2	2	1	1
6	1	1	2	2	1	1	1
7	1	2	1	2	1	1	1
8	2	2	2	2	2	2	2
9	1	1	2	1	1	1	1
10	2	1	2	1	2	2	2
11	2	2	3	2	3	2	2
12	1	2	1	1	2	1	1
13							
14							
15	1	1	2	2	1	1	1
16	1	2	2	2	2	1	1
17	1	2	2	2	1	1	1
18	1	1	1	1	1	1	1
19	1	1	2	1	1	1	1
20	2	2	1	2	1	1	2
21	2	1	1	1	2	1	1
22	1	1	2	2	1	1	2
23	1	1	1	1	2	1	1
24	2	1	2	2	2	2	1
25	1	2	2	1	1	2	1
26	1	1	1	1	1	1	1
27	1	2	1	1	1	1	1
28	1	1	2	1	1	1	1
29	1	2	2	1	1	1	1
30	1	2	1	2	1	1	1
31	1	1	1	1	1	1	1
32	1	1	2	1	2	1	1
33	2	1	2	2	2	2	2
34	2	2	2	2	2	2	1
35	1	2	2	2	1	2	1
36	2	2	2	2	2	2	2
37	1	1	2	1	1	2	2
38	2	1	2	1	2	1	1
39							
40							

Table 8.6
Depth-of-Knowledge Levels by Item and Reviewers
Intraclass Correlation
South Dakota Science 2008 Grade 8

Item	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Rater 6	Rater 7
41	2	1	2	2	2	2	2
42	2	1	2	1	2	1	1
43	1	2	1	2	2	2	1
44	1	2	2	2	1	1	1
45	1	1	3	1	1	1	1
46	1	1	1	1	1	1	1
47	1	1	1	1	2	1	1
48	2	2	2	1	2	1	1
49	1	1	2	2	1	2	1
50	2	2	2	1	2	2	1
51	2	1	2	1	2	2	1
52	2	2	2	2	2	1	1
53	2	1	1	2	2	2	2
54	1	2	2	1	1	1	1
55	1	1	1	1	1	1	1
56	1	1	1	1	1	1	1
57	2	2	3	2	1	2	1
58	2	2	2	1	1	2	1
59	1	2	2	2	2	1	1
60	2	1	2	2	2	2	1
61	1	1	1	1	1	1	1
62	2	2	2	1	2	2	1
63							
64							
65							
66	2	2	1	2	2	1	1
67	1	1	2	2	1	1	1
68	1	2	2	2	2	2	1
69	1	1	1	1	1	1	1
70	2	2	2	2	1	2	1
71	2	1	2	1	1	1	1
72	1	1	1	1	1	1	1
73	2	2	2	2	2	2	1
74	1	1	1	1	1	1	1
75	1	1	2	1	1	1	1
76	2	2	2	2	2	2	2
77	1	1	1	2	1	2	1

Intraclass Correlation: 0.7484
Pairwise Comparison: 0.6211

Table 8.8
DOK Levels and Objectives Coded by Each Reviewer
South Dakota Science 2008 Grade 8

Item	DOK0	PObj0	DOK1	PObj1	DOK2	PObj2	S1Obj2	DOK3	PObj3	DOK4	PObj4	DOK5	PObj5	DOK6	PObj6
1	2	8.N.1.1	2	8.N.1.1	2	8.N.1.1		1	8.N.1.1	1	8.N.1.1	1	8.N.1.1	1	8.N.1.1
2	1	8.P.1.3	1	8.P.1.3	1	8.P.1.3		1	8.P.1.3	1	8.P.1.3	1	8.P.1.3	1	8.P.1.3
3	2	8.S.2.1	2	8.S.2.1	3	8.S.2.1		2	8.S.2.1	2	8.S.2.1	2	8.S.2.1	1	8.S.2.1
4	1	8.S.1.1	2	8.S.1.1	2	8.S.1.1	8.E.1.3	1	8.S.1.1	2	8.S.1.1	2	8.S.1.1	1	8.S.1.1
5	1	8.S.2.1	2	8.S.2.1	2	8.S.2.1		2	8.S.2.1	2	8.S.2.1	1	8.S.2.1	1	8.S.2.1
6	1	8.E.1.4	1	8.E.1.4	2	8.E.1.4		2	8.E.1.4	1	8.E.1.4	1	8.E.1.4	1	8.E.1.4
7	1	8.E.2.2	2	8.E.2.2	1	8.E.2.2		2	8.E.2.2	1	8.E.2.2	1	8.E.2.2	1	8.E.2.2
8	2	8.N.2.1	2	8.N.2.1	2	8.N.2.1		2	8.N.2.1	2	8.N.2.1	2	8.N.2.1	2	8.N.2.1
9	1	8.E.1.1	1	8.E.1.1	2	8.E.1.1		1	8.E.1.1	1	8.E.1.1	1	8.E.1.1	1	8.E.1.1
10	2	8.N.2.1	1	8.N.1.1	2	8.N.1.1		1	8.N.2.1	2	8.N.1.1	2	8.N.1.1	2	8.N.2.1
11	2	8.N.2.1	2	8.N.2.1	3	8.N.2.1		2	8.N.2.1	3	8.N.2.1	2	8.N.2.1	2	8.N.2.1
12	1	8.S.1.1	2	8.S.1.1	1	8.S.1.1		1	8.S.1.1	2	8.S.2.1	1	8.S.1.1	1	8.S.2.1
13															
14															
15	1	8.E.1.2	1	8.E.1.2	2	8.E.1.2		2	8.E.1.2	1	8.E.1.2	1	8.E.1.2	1	8.E.1.2
16	1	8.P.1.2	2	8.P.1.2	2	8.P.1.2		2	8.P.1.2	2	8.P.1.2	1	8.P.1.2	1	8.P.1.2
17	1	8.E.1.4	2	8.E.1.4	2	8.E.1.4		2	8.E.1.4	1	8.E.1.4	1	8.E.1.4	1	8.E.1.4
18	1	8.P.1.1	1	8.P.1.1	1	8.P.1.1		1	8.P.1.1	1	8.P.1.1	1	8.P.1.1	1	8.P.1.1
19	1	8.E.1.5	1	8.E.1.5	2	8.E.1.5		1	8.E.1.5	1	8.E.1.5	1	8.E.1.5	1	8.E.1.5
20	2	8.E.1.2	2	8.E.1.2	1	8.E.1.2		2	8.E.1.2	1	8.E.1.2	1	8.E.1.2	2	8.E.1.2
21	2	8.E.2.1	1	8.E.2.1	1	8.E.2.1		1	8.E.2.1	2	8.E.2.1	1	8.E.2.1	1	8.E.2.1
22	1	8.P.1.1	1	8.P.1.2	2	8.P.1.1	8.E.1.3	2	8.P.1.1	1	8.P.1.1	1	8.P.1.1	2	8.P.1.1
23	1	8.N.2.1	1	8.N.2.1	1	8.N.2.1		1	8.N.2.1	2	8.N.2.1	1	8.N.2.1	1	8.N.2.1
24	2	8.E.1.3	1	8.E.1.3	2	8.E.1.3		2	8.E.1.3	2	8.E.1.3	2	8.E.1.3	1	8.E.1.3
25	1	8.S.1.1	2	8.S.1.1	2	8.S.1.1		1	8.S.1.1	1	8.S.1.1	2	8.S.1.1	1	8.S.1.1
26	1	8.N.1.1	1	8.N.1.1	1	8.N.1.1		1	8.N.1.1	1	8.E.1.1	1	8.N.1.1	1	8.N.1.1
27	1	8.E.1.5	2	8.E.1.5	1	8.E.1.5		1	8.E.1.5	1	8.E.1.5	1	8.E.1.5	1	8.E.1.5
28	1	8.N.1.1	1	8.N.1.1	2	8.N.1.1		1	8.N.1.1	1	8.N.1.1	1	8.N.1.1	1	8.N.1.1
29	1	8.N.1.1	2	8.N.1.1	2	8.N.1.1		1	8.N.1.1	1	8.N.1.1	1	8.N.1.1	1	8.N.1.1
30	1	8.S.1.1	2	8.S.1.1	1	8.S.1.1		2	8.S.1.1	1	8.S.1.1	1	8.S.1.1	1	8.S.1.1
31	1	8.P.1.1	1	8.P.1.1	1	8.P.1.1		1	8.P.1.1	1	8.P.1.1	1	8.P.1.1	1	8.P.1.1
32	1	8.E.1.2	1	8.E.1.2	2	8.E.1.2		1	8.E.1.2	2	8.E.1.2	1	8.E.1.2	1	8.E.1.2
33	2	8.E.1.1	1	8.E.1.1	2	8.E.1.1		2	8.E.1.1	2	8.E.1.1	2	8.E.1.1	2	8.E.1.1
34	2	8.S.2.1	2	8.S.2.1	2	8.S.2.1		2	8.S.2.1	2	8.S.2.1	2	8.S.2.1	1	8.S.2.1
35	1	8.E.1.5	2	8.E.1.5	2	8.E.1.5		2	8.E.1.5	1	8.S.2.1	2	8.E.1.5	1	8.E.1.5
36	2	8.S.2.1	2	8.S.2.1	2	8.S.2.1		2	8.S.2.1	2	8.S.2.1	2	8.S.2.1	2	8.S.2.1
37	1	8.E.2.2	1	8.E.2.2	2	8.E.2.2		1	8.E.2.2	1	8.E.2.2	2	8.E.2.2	2	8.E.2.2
38	2	8.N.2.1	1	8.N.2.1	2	8.N.2.1		1	8.N.2.1	2	8.N.2.1	1	8.N.2.1	1	8.N.2.1

Table 8.8
DOK Levels and Objectives Coded by Each Reviewer
South Dakota Science 2008 Grade 8

Item	DOK0	PObj0	DOK1	PObj1	DOK2	PObj2	S1Obj2	DOK3	PObj3	DOK4	PObj4	DOK5	PObj5	DOK6	PObj6
39															
40															
41	2	8.E.1.1	1	8.E.1.1	2	8.E.1.1		2	8.E.1.1	2	8.E.1.1	2	8.E.1.1	2	8.E.1.1
42	2	8.P.1.2	1	8.P.1.2	2	8.P.1.2		1	8.P.1.2	2	8.P.1.2	1	8.P.1.2	1	8.P.1.2
43	1	8.P.1.3	2	8.P.1.3	1	8.P.1.3		2	8.E.1.5	2	8.E.1.5	2	8.P.1.3	1	8.P.1.3
44	1	8.S.1.1	2	8.S.1.1	2	8.S.1.1		2	8.S.1.1	1	8.S.1.1	1	8.S.1.1	1	8.S.1.1
45	1	8.P.1.2	1	8.P.1.2	3	8.P.1.2		1	8.P.1.2	1	8.P.1.2	1	8.P.1.2	1	8.P.1.2
46	1	8.E.1.3	1	8.E.1.3	1	8.E.2.2		1	8.E.1.3	1	8.P.1.3	1	8.E.1.3	1	8.E.1.3
47	1	8.P.1.1	1	8.P.1.1	1	8.P.1.1		1	8.P.1.1	2	8.P.1.1	1	8.P.1.1	1	8.P.1.1
48	2	8.P.1.3	2	8.P.1.3	2	8.P.1.3		1	8.P.1.3	2	8.P.1.3	1	8.P.1.3	1	8.P.1.3
49	1	8.E.2.2	1	8.E.2.2	2	8.E.2.2		2	8.E.2.2	1	8.E.2.2	2	8.E.2.2	1	8.E.2.2
50	2	8.N.1.1	2	8.N.1.1	2	8.N.1.1		1	8.N.1.1	2	8.N.1.1	2	8.N.1.1	1	8.N.1.1
51	2	8.N.2.1	1	8.N.2.1	2	8.N.2.1		1	8.N.2.1	2	8.N.2.1	2	8.N.2.1	1	8.N.2.1
52	2	8.E.1.3	2	8.E.1.3	2	8.E.1.3		2	8.E.1.3	2	8.E.1.3	1	8.E.1.3	1	8.E.1.3
53	2	8.E.2.1	1	8.E.2.1	1	8.E.2.1		2	8.E.2.1	2	8.E.2.1	2	8.E.2.1	2	8.E.2.1
54	1	8.E.1.5	2	8.E.1.2	2	8.E.1.5		1	8.E.1.5	1	8.E.1.2	1	8.E.1.5	1	8.E.1.5
55	1	8.P.1.3	1	8.E.1.5	1	8.P.1.3		1	8.E.1.5	1	8.E.1.5	1	8.P.1.3	1	8.P.1.3
56	1	8.E.2.1	1	8.E.2.1	1	8.E.2.1		1	8.E.2.1	1	8.E.2.1	1	8.E.2.1	1	8.E.2.1
57	2	8.S.2.1	2	8.S.2.1	3	8.S.2.1		2	8.S.2.1	1	8.S.2.1	2	8.S.2.1	1	8.S.2.1
58	2	8.S.1.1	2	8.S.1.1	2	8.S.1.1		1	8.S.1.1	1	8.S.1.1	2	8.S.1.1	1	8.S.1.1
59	1	8.P.1.3	2	8.P.1.3	2	8.P.1.3		2	8.P.1.3	2	8.P.1.3	1	8.P.1.3	1	8.P.1.3
60	2	8.N.2.1	1	8.N.2.1	2	8.N.2.1		2	8.N.2.1	2	8.N.2.1	2	8.N.2.1	1	8.N.2.1
61	1	8.N.1.1	1	8.N.1.1	1	8.N.1.1		1	8.N.1.1	1	8.N.1.1	1	8.N.1.1	1	8.N.1.1
62	2	8.E.1.2	2	8.E.1.2	2	8.E.1.2		1	8.E.1.2	2	8.E.1.2	2	8.E.1.2	1	8.E.1.2
63															
64															
65															
66	2	8.S.1.1	2	8.S.1.1	1	8.S.1.1		2	8.S.1.1	2	8.S.2.1	1	8.S.1.1	1	8.S.1.1
67	1	8.E.1.2	1	8.E.1.2	2	8.E.1.2		2	8.E.1.2	1	8.E.1.2	1	8.E.1.2	1	8.E.1.2
68	1	8.S.2.1	2	8.S.2.1	2	8.E.1.5		2	8.E.1	2	8.S.2.1	2	8.S.2.1	1	8.S.2.1
69	1	8.E.1.1	1	8.E.1.1	1	8.E.1.1		1	8.E.1.1	1	8.E.1.1	1	8.E.1.1	1	8.E.1.1
70	2	8.E.1.4	2	8.E.1.4	2	8.E.1.4		2	8.E.1.4	1	8.E.1.4	2	8.E.1.4	1	8.E.1.4
71	2	8.N.2.1	1	8.N.2.1	2	8.N.2.1		1	8.N.2.1	1	8.E.1.1	1	8.N.2.1	1	8.N.2.1
72	1	8.P.1.2	1	8.P.1.2	1	8.P.1.2		1	8.P.1.2	1	8.P.1.2	1	8.P.1.2	1	8.P.1.2
73	2	8.S.2.1	2	8.S.1	2	8.S.2.1	8.E.1.5	2	8.S.2.1	2	8.E.1.5	2	8.S.2	1	8.S.2.1
74	1	8.P.1.1	1	8.P.1.1	1	8.P.1.1		1	8.P.1.1	1	8.P.1.1	1	8.P.1.1	1	8.P.1.1
75	1	8.E.2.2	1	8.E.2.2	2	8.E.2.2		1	8.E.2.2	1	8.E.2.2	1	8.E.2.2	1	8.E.2.2
76	2	8.E.1.4	2	8.E.1.4	2	8.E.1.4		2	8.E.1.4	2	8.E.1.4	2	8.E.1.4	2	8.E.1.4

Table 8.8
DOK Levels and Objectives Coded by Each Reviewer
South Dakota Science 2008 Grade 8

Item	DOK0	PObj0	DOK1	PObj1	DOK2	PObj2	S1Obj2	DOK3	PObj3	DOK4	PObj4	DOK5	PObj5	DOK6	PObj6
77	1	8.E.1.3	1	8.E.1.3	1	8.E.1.3		2	8.E.1.3	1	8.E.1.3	2	8.E.1.3	1	8.E.1.3

Objective Pairwise Comparison: 0.9073
Standard Pairwise Comparison: 0.9469

Table 8.9
Objectives Coded to Each Item by Reviewers
South Dakota Science 2008 Grade 8

Low		Medium		High
0		6.402597		8

1 3522117	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	
2 3505484	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	
3 3522194	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	
4 3504293	8.E.1.3	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1
5 3504297	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	
6 3505635	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	
7 3505504	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	
8 3522201	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	
9 3505402	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	
10 3504288	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.2.1	8.N.2.1	8.N.2.1	
11 3522244	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	
12 3522192	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.2.1	8.S.2.1	
13								
14								
15 3505630	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	
16 3522168	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	
17 3505456	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	
18 3505437	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	
19 3526361	8.E.1.5	8.E.1.5	8.E.1.5	8.E.1.5	8.E.1.5	8.E.1.5	8.E.1.5	
20 3505407	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	
21 3504282	8.E.2.1	8.E.2.1	8.E.2.1	8.E.2.1	8.E.2.1	8.E.2.1	8.E.2.1	
22 3522247	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.2	8.E.1.3
23 3504291	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	
24 3505451	8.E.1.3	8.E.1.3	8.E.1.3	8.E.1.3	8.E.1.3	8.E.1.3	8.E.1.3	
25 3504286	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	
26 3505471	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.E.1.1	
27 3505458	8.E.1.5	8.E.1.5	8.E.1.5	8.E.1.5	8.E.1.5	8.E.1.5	8.E.1.5	
28 3505432	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	
29 3505409	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	
30 3522276	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	
31 3504280	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	
32 3505406	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	
33 3505447	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	
34 3522235	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	
35 3505422	8.E.1.5	8.E.1.5	8.E.1.5	8.E.1.5	8.E.1.5	8.E.1.5	8.S.2.1	
36 3505501	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	
37 3504284	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	
38 3505435	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	

Table 8.9
Objectives Coded to Each Item by Reviewers
South Dakota Science 2008 Grade 8

39								
40								
41 3505487	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	
42 3505439	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	
43 3522129	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	8.E.1.5	8.E.1.5	
44 3522232	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	
45 3505441	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	
46 3505492	8.P.1.3	8.E.1.3	8.E.1.3	8.E.1.3	8.E.1.3	8.E.1.3	8.E.2.2	
47 3504281	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	
48 3505485	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	
49 3505426	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	
50 3522242	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	
51 3505411	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	
52 3505493	8.E.1.3	8.E.1.3	8.E.1.3	8.E.1.3	8.E.1.3	8.E.1.3	8.E.1.3	
53 3526355	8.E.2.1	8.E.2.1	8.E.2.1	8.E.2.1	8.E.2.1	8.E.2.1	8.E.2.1	
54 3505639	8.E.1.2	8.E.1.2	8.E.1.5	8.E.1.5	8.E.1.5	8.E.1.5	8.E.1.5	
55 3505624	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	8.E.1.5	8.E.1.5	8.E.1.5	
56 3504283	8.E.2.1	8.E.2.1	8.E.2.1	8.E.2.1	8.E.2.1	8.E.2.1	8.E.2.1	
57 3522233	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	
58 3522132	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	
59 3505399	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	8.P.1.3	
60 3522246	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	
61 3505433	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	8.N.1.1	
62 3505405	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	
63								
64								
65								
66 3522134	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.1.1	8.S.2.1	
67 3505491	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	8.E.1.2	
68 3522234	8.E.1	8.E.1.5	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1	
69 3505403	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	8.E.1.1	
70 3505636	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	
71 3504290	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.N.2.1	8.E.1.1	
72 3505480	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	8.P.1.2	
73 3505479	8.E.1.5	8.E.1.5	8.S.1	8.S.2	8.S.2.1	8.S.2.1	8.S.2.1	8.S.2.1
74 3522204	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	8.P.1.1	
75 3505505	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	8.E.2.2	
76 3505418	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	8.E.1.4	
77 3505415	8.E.1.3	8.E.1.3	8.E.1.3	8.E.1.3	8.E.1.3	8.E.1.3	8.E.1.3	

Table 8.10
Items Coded by Reviewers to Each Objective
South Dakota Science 2008 Grade 8

Low		Medium		High
0		18.96154		51

8.N																				
8.N.1																				
8.N.1.1	1	1	1	1	1	1	1	10	10	10	10	26	26	26	26	26	26	28	28	28
	28	28	28	28	29	29	29	29	29	29	29	29	50	50	50	50	50	50	50	61
	61	61	61	61	61	61														
8.N.2																				
8.N.2.1	8	8	8	8	8	8	8	10	10	10	11	11	11	11	11	11	11	23	23	23
	23	23	23	23	38	38	38	38	38	38	38	38	51	51	51	51	51	51	51	60
	60	60	60	60	60	60	71	71	71	71	71	71								
8.P																				
8.P.1																				
8.P.1.1	18	18	18	18	18	18	18	22	22	22	22	22	22	31	31	31	31	31	31	31
	47	47	47	47	47	47	47	74	74	74	74	74	74	74						
8.P.1.2	16	16	16	16	16	16	16	22	42	42	42	42	42	42	42	45	45	45	45	45
	45	45	72	72	72	72	72	72	72											
8.P.1.3	2	2	2	2	2	2	2	43	43	43	43	43	46	48	48	48	48	48	48	48
	55	55	55	55	59	59	59	59	59	59	59									
8.E																				
8.E.1	68																			
8.E.1.1	9	9	9	9	9	9	9	26	33	33	33	33	33	33	33	41	41	41	41	41
	41	41	69	69	69	69	69	69	69	71										
8.E.1.2	15	15	15	15	15	15	15	20	20	20	20	20	20	20	32	32	32	32	32	32
	3	5	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6			

Table 8.10
Items Coded by Reviewers to Each Objective
South Dakota Science 2008 Grade 8

	2	4	4	2	2	2	2	2	2	2	7	7	7	7	7	7	7					
8.E.1.3	4	22	24	24	24	24	24	24	24	46	46	46	46	46	52	52	52	52	52	52		
	52	77	77	77	77	77	77	77														
8.E.1.4	6	6	6	6	6	6	6	17	17	17	17	17	17	17	70	70	70	70	70	70		
	70	76	76	76	76	76	76	76														
8.E.1.5	19	19	19	19	19	19	19	27	27	27	27	27	27	27	35	35	35	35	35	35		
	43	43	54	54	54	54	54	55	55	55	68	73	73									
8.E.2																						
8.E.2.1	21	21	21	21	21	21	21	53	53	53	53	53	53	53	56	56	56	56	56	56		
	56																					
8.E.2.2	7	7	7	7	7	7	7	37	37	37	37	37	37	37	46	49	49	49	49	49		
	49	49	75	75	75	75	75	75	75													
8.S																						
8.S.1	73																					
8.S.1.1	4	4	4	4	4	4	4	12	12	12	12	12	25	25	25	25	25	25	25	30		
	30	30	30	30	30	30	44	44	44	44	44	44	44	58	58	58	58	58	58			
	58	66	66	66	66	66	66															
8.S.2	73																					
8.S.2.1	3	3	3	3	3	3	3	5	5	5	5	5	5	5	12	12	34	34	34	34		
	34	34	34	35	36	36	36	36	36	36	36	57	57	57	57	57	57	57	66			
	68	68	68	68	68	73	73	73	73													

Table 8.11
Number of Reviewers Coding an Item by Objective (Item Number: Number of Reviewers)
South Dakota Science 2008 Grade 8

Low		Medium		High
1		3		7

8.N									
8.N.1									
8.N.1.1	1:7	10:4	26:6	28:7	29:7	50:7	61:7		
8.N.2									
8.N.2.1	8:7	10:3	11:7	23:7	38:7	51:7	60:7	71:6	
8.P									
8.P.1									
8.P.1.1	18:7	22:6	31:7	47:7	74:7				
8.P.1.2	16:7	22:1	42:7	45:7	72:7				
8.P.1.3	2:7	43:5	46:1	48:7	55:4	59:7			
8.E									
8.E.1	68:1								
8.E.1.1	9:7	26:1	33:7	41:7	69:7	71:1			
8.E.1.2	15:7	20:7	32:7	54:2	62:7	67:7			
8.E.1.3	4:1	22:1	24:7	46:5	52:7	77:7			
8.E.1.4	6:7	17:7	70:7	76:7					
8.E.1.5	19:7	27:7	35:6	43:2	54:5	55:3	68:1	73:2	
8.E.2									
8.E.2.1	21:7	53:7	56:7						
8.E.2.2	7:7	37:7	46:1	49:7	75:7				
8.S									
8.S.1	73:1								
8.S.1.1	4:7	12:5	25:7	30:7	44:7	58:7	66:6		
8.S.2	73:1								
8.S.2.1	3:7	5:7	12:2	34:7	35:1	36:7	57:7	66:1	68:5	73:4

Table 8.12
Number of Reviewers Coding an Objective by Item (Objective: Number of Reviewers)
South Dakota Science 2008 Grade 8

Low		Medium		High
1		3		7

1 3522117	8.N.1.1:7		
2 3505484	8.P.1.3:7		
3 3522194	8.S.2.1:7		
4 3504293	8.E.1.3:1	8.S.1.1:7	
5 3504297	8.S.2.1:7		
6 3505635	8.E.1.4:7		
7 3505504	8.E.2.2:7		
8 3522201	8.N.2.1:7		
9 3505402	8.E.1.1:7		
10 3504288	8.N.1.1:4	8.N.2.1:3	
11 3522244	8.N.2.1:7		
12 3522192	8.S.1.1:5	8.S.2.1:2	
13			
14			
15 3505630	8.E.1.2:7		
16 3522168	8.P.1.2:7		
17 3505456	8.E.1.4:7		
18 3505437	8.P.1.1:7		
19 3526361	8.E.1.5:7		
20 3505407	8.E.1.2:7		
21 3504282	8.E.2.1:7		
22 3522247	8.P.1.1:6	8.P.1.2:1	8.E.1.3:1
23 3504291	8.N.2.1:7		
24 3505451	8.E.1.3:7		
25 3504286	8.S.1.1:7		
26 3505471	8.N.1.1:6	8.E.1.1:1	
27 3505458	8.E.1.5:7		
28 3505432	8.N.1.1:7		
29 3505409	8.N.1.1:7		
30 3522276	8.S.1.1:7		
31 3504280	8.P.1.1:7		
32 3505406	8.E.1.2:7		
33 3505447	8.E.1.1:7		
34 3522235	8.S.2.1:7		
35 3505422	8.E.1.5:6	8.S.2.1:1	
36 3505501	8.S.2.1:7		
37 3504284	8.E.2.2:7		
38 3505435	8.N.2.1:7		

Table 8.12
Number of Reviewers Coding an Objective by Item (Objective: Number of Reviewers)
South Dakota Science 2008 Grade 8

39				
40				
41 3505487	8.E.1.1:7			
42 3505439	8.P.1.2:7			
43 3522129	8.P.1.3:5	8.E.1.5:2		
44 3522232	8.S.1.1:7			
45 3505441	8.P.1.2:7			
46 3505492	8.P.1.3:1	8.E.1.3:5	8.E.2.2:1	
47 3504281	8.P.1.1:7			
48 3505485	8.P.1.3:7			
49 3505426	8.E.2.2:7			
50 3522242	8.N.1.1:7			
51 3505411	8.N.2.1:7			
52 3505493	8.E.1.3:7			
53 3526355	8.E.2.1:7			
54 3505639	8.E.1.2:2	8.E.1.5:5		
55 3505624	8.P.1.3:4	8.E.1.5:3		
56 3504283	8.E.2.1:7			
57 3522233	8.S.2.1:7			
58 3522132	8.S.1.1:7			
59 3505399	8.P.1.3:7			
60 3522246	8.N.2.1:7			
61 3505433	8.N.1.1:7			
62 3505405	8.E.1.2:7			
63				
64				
65				
66 3522134	8.S.1.1:6	8.S.2.1:1		
67 3505491	8.E.1.2:7			
68 3522234	8.E.1:1	8.E.1.5:1	8.S.2.1:5	
69 3505403	8.E.1.1:7			
70 3505636	8.E.1.4:7			
71 3504290	8.N.2.1:6	8.E.1.1:1		
72 3505480	8.P.1.2:7			
73 3505479	8.E.1.5:2	8.S.1:1	8.S.2:1	8.S.2.1:4
74 3522204	8.P.1.1:7			
75 3505505	8.E.2.2:7			
76 3505418	8.E.1.4:7			
77 3505415	8.E.1.3:7			

Table 8.13
Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])
South Dakota Science 2008 Grade 8

Low DOK		Matched DOK		High DOK
1		3		7

8.N [3]:							
8.N.1 [2]:							
8.N.1.1 [2]:	1:7[1.43]	10:4 [1.75]	26:6 [1]	28:7 [1.14]	29:7 [1.29]	50:7 [1.71]	61:7 [1]
8.N.2 [3]:							
8.N.2.1 [3]:	8:7[2]	10:3 [1.67]	11:7 [2.29]	23:7 [1.14]	38:7 [1.43]	51:7 [1.57]	60:7 [1.71]	71:6 [1.33]
8.P [2]:							
8.P.1 [2]:							
8.P.1.1 [2]:	18:7 [1]	22:6 [1.5]	31:7 [1]	47:7 [1.14]	74:7 [1]		
8.P.1.2 [2]:	16:7 [1.57]	22:1 [1]	42:7 [1.43]	45:7 [1.29]	72:7 [1]		
8.P.1.3 [2]:	2:7[1]	43:5 [1.4]	46:1 [1]	48:7 [1.57]	55:4 [1]	59:7 [1.57]	
8.E [2]:							
8.E.1 [2]:	68:1 [2]						
8.E.1.1 [2]:	9:7[1.14]	26:1 [1]	33:7 [1.86]	41:7 [1.86]	69:7 [1]	71:1 [1]	
8.E.1.2	15:7 [1.2	20:7 [1.5	32:7 [1.2	54:2 [1.5]	62:7 [1.7	67:7 [1.2	

Table 8.13
Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])
South Dakota Science 2008 Grade 8

[1]:	9]	7]	9]		1]	9]				
8.E.1.3 [2]:	4:1[2]	22:1 [2]	24:7 [1.71]	46:5 [1]	52:7 [1.71]	77:7 [1.29]				
8.E.1.4 [2]:	6:7[1.29]	17:7 [1.43]	70:7 [1.71]	76:7 [2]						
8.E.1.5 [2]:	19:7 [1.14]	27:7 [1.14]	35:6 [1.67]	43:2 [2]	54:5 [1.2]	55:3 [1]	68:1 [2]	73:2 [2]		
8.E.2 [2]:										
8.E.2.1 [1]:	21:7 [1.29]	53:7 [1.71]	56:7 [1]							
8.E.2.2 [2]:	7:7[1.29]	37:7 [1.43]	46:1 [1]	49:7 [1.43]	75:7 [1.14]					
8.S [3]:										
8.S.1 [2]:	73:1 [2]									
8.S.1.1 [2]:	4:7[1.57]	12:5 [1.2]	25:7 [1.43]	30:7 [1.29]	44:7 [1.43]	58:7 [1.57]	66:6 [1.5]			
8.S.2 [3]:	73:1 [2]									
8.S.2.1 [3]:	3:7[2]	5:7[1.57]	12:2 [1.5]	34:7 [1.86]	35:1 [1]	36:7 [2]	57:7 [1.86]	66:1 [2]	68:5 [1.6]	73:4 [1.75]

Table 11.1
Categorical Concurrence Between Standards and Assessment as Rated by Seven Reviewers
South Dakota Science 2008 Grade 11
Number of Assessment Items - 84

Standards			Level by Objective			Hits		Cat. Concurr.
Title	Goals #	Objs #	Level	# of objs by Level	% w/in std by Level	Mean	S.D.	
9-12.N - NATURE OF SCIENCE	2	4.29	1 3	1 3	25 75	12.57	0.90	YES
9-12.P - PHYSICAL SCIENCE	3	11.86	2	11	100	23	1.69	YES
9-12.L - LIFE SCIENCE	3	6.14	1 2 3	1 4 1	16 66 16	22.43	0.90	YES
9-12.E - EARTH/SPACE SCIENCE	2	4	2	4	100	11	2.33	YES
9-12.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	2	5.14	2 3	2 3	40 60	15	0.76	YES
Total	12	31.43	1 2 3	2 21 7	6 70 23	84	0	

Table 11.2a
Alternate Depth-of-Knowledge Consistency Between Standards and Assessment as Rated by Seven Reviewers (Does Not Assume Each Objective Should Have Equal Representation)
South Dakota Science 2008 Grade 11
Number of Assessment Items - 84

Standards			Hits		Level of Item w.r.t. Standard						DOK Consistency
					% Under		% At		% Above		
Title	Goals #	Objs #	M	S.D.	M	S.D.	M	S.D.	M	S.D.	
9-12.N - NATURE OF SCIENCE	2	4.29	12.57	0.90	79	250	16	35	5	13	NO
9-12.P - PHYSICAL SCIENCE	3	11.86	23	1.69	51	108	49	44	0	0	WEAK
9-12.L - LIFE SCIENCE	3	6.14	22.43	0.90	64	357	30	37	6	19	NO
9-12.E - EARTH/SPACE SCIENCE	2	4	11	2.33	59	175	41	39	0	0	WEAK
9-12.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	2	5.14	15	0.76	59	212	41	39	0	0	WEAK
Total	12	31.43	84	0	59	43	39	41	2	10	

Table 11.3
Range-of-Knowledge Correspondence and Balance of Representation Between Standards and Assessment as Rated by Seven Reviewers
South Dakota Science 2008 Grade 11
Number of Assessment Items - 84

Standards			Hits		Range of Objectives				Rng. of Know.	Balance Index				Bal. of Represent.
					# Objs Hit		% of Total			% Hits in Std/Ttl Hits		Index		
Title	Goals #	Objs #	Mean	S.D.	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
9-12.N - NATURE OF SCIENCE	2	4.29	12.57	0.90	4.29	0.45	100	0	YES	15	1	0.79	0.08	YES
9-12.P - PHYSICAL SCIENCE	3	11.86	23	1.69	11.43	0.73	96	4	YES	27	2	0.81	0.04	YES
9-12.L - LIFE SCIENCE	3	6.14	22.43	0.90	5.14	0.35	84	1	YES	27	1	0.82	0.04	YES
9-12.E - EARTH/SPACE SCIENCE	2	4	11	2.33	4	0	100	0	YES	13	3	0.81	0.04	YES
9-12.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	2	5.14	15	0.76	4.29	0.88	83	13	YES	18	1	0.76	0.07	YES
Total	12	31.43	84	0	5.83	2.88	93	10		20	6	0.80	0.06	

Table 11.4
Summary of Attainment of Acceptable Alignment Level on Four Content Focus Criteria as Rated by Seven Reviewers
South Dakota Science 2008 Grade 11
Number of Assessment Items - 84

Standards	Alignment Criteria			
	Categorical Concurrence	Depth-of-Knowledge Consistency	Range of Knowledge	Balance of Representation
9-12.N - NATURE OF SCIENCE	YES	NO	YES	YES
9-12.P - PHYSICAL SCIENCE	YES	WEAK	YES	YES
9-12.L - LIFE SCIENCE	YES	NO	YES	YES
9-12.E - EARTH/SPACE SCIENCE	YES	WEAK	YES	YES
9-12.S - SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY	YES	WEAK	YES	YES

Table 11.6
Depth-of-Knowledge Levels by Item and Reviewers
Intraclass Correlation
South Dakota Science 2008 Grade 11

Item	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Rater 6	Rater 7
1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2
4	1	2	2	1	1	1	2
5	1	2	2	2	2	1	1
6	2	2	1	2	2	1	1
7	1	2	1	2	2	2	1
8	2	2	2	2	2	2	2
9							
10							
11							
12	2	2	2	2	2	2	1
13	1	1	2	2	2	1	1
14	1	1	1	1	1	1	1
15	1	1	1	1	1	1	1
16	1	1	2	1	1	2	1
17	2	1	2	2	1	2	2
18	2	2	2	2	2	1	2
19	1	2	2	2	2	2	1
20	1	1	1	1	1	2	1
21	2	2	2	2	1	2	2
22	1	1	2	1	2	2	1
23	2	1	2	1	2	2	2
24	2	2	2	2	1	2	1
25	1	2	2	2	1	2	2
26	1	1	1	1	1	2	2
27	1	2	2	1	1	2	2
28	1	1	1	1	1	1	2
29	1	2	2	2	2	2	1
30	1	2	2	2	2	1	1
31	1	2	2	2	1	1	1
32	1	2	2	2	1	2	1
33	1	2	2	2	2	1	1
34	1	1	1	1	1	1	1
35	1	1	2	1	1	1	1
36	2	2	2	2	2	2	1
37	2	1	2	1	1	2	1
38	2	2	2	1	1	2	2
39	1	2	2	2	2	2	2
40	1	1	1	1	1	1	1

Table 11.6
Depth-of-Knowledge Levels by Item and Reviewers
Intraclass Correlation
South Dakota Science 2008 Grade 11

Item	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Rater 6	Rater 7
41	2	2	1	2	1	2	2
42	2	2	2	2	2	2	2
43	1	1	1	1	1	1	1
44	1	1	1	1	1	1	1
45	2	2	2	1	1	2	2
46	1	1	1	2	1	2	1
47	2	2	2	1	1	1	2
48							
49							
50							
51	1	1	1	1	1	1	2
52	2	2	2	2	2	2	1
53	1	1	1	1	1	1	1
54	2	1	2	1	2	2	2
55	2	2	2	2	2	2	2
56	1	1	1	1	1	1	1
57	2	2	2	2	2	2	2
58	2	2	2	2	1	2	2
59	2	2	2	2	2	2	2
60	2	1	2	2	1	1	1
61	2	2	2	1	2	2	2
62	1	1	1	1	1	2	1
63	1	1	1	1	2	1	2
64	2	1	2	1	1	2	2
65	1	2	2	1	1	2	2
66	2	2	2	2	2	2	2
67	1	1	1	1	2	1	1
68	1	2	2	1	2	2	1
69	2	2	2	2	2	2	2
70	1	1	1	1	1	1	1
71	1	2	2	1	1	2	1
72	1	1	1	1	1	2	1
73	2	2	2	2	2	2	1
74	2	2	2	2	2	2	2
75	1	1	2	2	1	2	1
76	1	2	2	1	2	2	2
77	2	2	2	1	1	2	2
78	1	1	1	1	1	1	1
79							
80							

Table 11.6
Depth-of-Knowledge Levels by Item and Reviewers
Intraclass Correlation
South Dakota Science 2008 Grade 11

Item	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Rater 6	Rater 7
81							
82	2	2	2	2	2	1	1
83	1	1	2	1	2	2	1
84	1	1	2	1	1	2	1
85	1	1	1	1	1	1	1
86	1	2	2	1	1	2	1
87	2	2	2	2	1	2	2
88	1	1	1	2	1	2	1
89	1	1	2	2	1	2	1
90	1	1	1	2	1	1	1
91	1	2	2	1	1	1	1
92	1	2	2	1	1	2	1
93	1	1	1	1	1	1	1

Intraclass Correlation: 0.7991
Pairwise Comparison: 0.6689

Table 11.8
DOK Levels and Objectives Coded by Each Reviewer
South Dakota Science 2008 Grade 11

Item	DOK0	PObj0	DOK1	PObj1	DOK2	PObj2	DOK3	PObj3	DOK4	PObj4	DOK5	PObj5	DOK6	PObj6
1	1	9-12.N.2.1	1	9-12.N.2.2	1	9-12.N.2.2	1	9-12.N.2.2	1	9-12.N.2.2	1	9-12.N.2.2	1	9-12.N.2.2
2	2	9-12.N.1.2	2	9-12.N.2.1	2	9-12.N.2.1	2	9-12.N.2.1	2	9-12.N.2.1	2	9-12.N.1.2	2	9-12.N.2.1
3	2	9-12.P.2.2	2	9-12.P.2.2	2	9-12.P.2.2	2	9-12.P.2.2	2	9-12.N.1.2	2	9-12.P.2.2	2	9-12.P.2.2
4	1	9-12.N.2.2	2	9-12.P.2.2	2	9-12.N.2.2	1	9-12.S.1.2	1	9-12.N.2.2	1	9-12.N.2.2	2	9-12.N.2.2
5	1	9-12.L.1.3	2	9-12.L.1.3	2	9-12.L.1.3	2	9-12.L.1.3	2	9-12.L.1.3	1	9-12.L.1.3	1	9-12.L.1.3
6	2	9-12.L.3.1	2	9-12.L.3.1	1	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1	1	9-12.L.3.1	1	9-12.L.3.1
7	1	9-12.S.2.3	2	9-12.S.2.3	1	9-12.S.2.3	2	9-12.S.1.2	2	9-12.S.2.3	2	9-12.S.2.3	1	9-12.S.1.2
8	2	9-12.N.2.1	2	9-12.N.2.1	2	9-12.N.2.1	2	9-12.N.2.1	2	9-12.L.3.1	2	9-12.N.2.1	2	9-12.N.2.1
9														
10														
11														
12	2	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1	1	9-12.L.3.1
13	1	9-12.P.3.3	1	9-12.P.3.3	2	9-12.P.3.3	2	9-12.P.3.3	2	9-12.P.3.3	1	9-12.P.3.3	1	9-12.P.3.3
14	1	9-12.N.1.1	1	9-12.N.1.1	1	9-12.N.1	1	9-12.N.1.2	1	9-12.N.1.1	1	9-12.N.1.1	1	9-12.N.1.1
15	1	9-12.P.1.2	1	9-12.P.1.2	1	9-12.P.1.2	1	9-12.P.1.2	1	9-12.P.1.2	1	9-12.P.1.2	1	9-12.P.1.2
16	1	9-12.P.1.1	1	9-12.P.1.1	2	9-12.P.1.1	1	9-12.P.1.1	1	9-12.P.1.1	2	9-12.P.1.1	1	9-12.P.1.1
17	2	9-12.P.2.3	1	9-12.P.2.3	2	9-12.P.2.3	2	9-12.P.2.3	1	9-12.P.2.3	2	9-12.P.2.3	2	9-12.P.2.3
18	2	9-12.P.2.2	2	9-12.P.2.1	2	9-12.P.2.2	2	9-12.P.2.2	2	9-12.P.2.2	1	9-12.P.2.2	2	9-12.P.2.2
19	1	9-12.L.2.2	2	9-12.L.2.2	2	9-12.L.2.2	2	9-12.L.2.2	2	9-12.L.2.2	2	9-12.L.2.2	1	9-12.L.2.2
20	1	9-12.E.1.1	1	9-12.E.1.1	1	9-12.E.1.1	1	9-12.E.1.1	1	9-12.E.1.1	2	9-12.E.1.1	1	9-12.E.1.1
21	2	9-12.E.2.1	2	9-12.E.2.1	2	9-12.E.2.1	2	9-12.P.2.2	1	9-12.E.2.1	2	9-12.E.2.1	2	9-12.E.2.1
22	1	9-12.L.1.3	1	9-12.S.1.2	2	9-12.S.1	1	9-12.S.1.2	2	9-12.S.1.2	2	9-12.S.1.2	1	9-12.L.3.1
23	2	9-12.L.2.1	1	9-12.L.2.1	2	9-12.L.2.1	1	9-12.L.2.1	2	9-12.L.2.1	2	9-12.L.2.1	2	9-12.L.2.1
24	2	9-12.P.1.4	2	9-12.P.1.2	2	9-12.P.1.4	2	9-12.P.1.4	1	9-12.P.1.2	2	9-12.P.1.4	1	9-12.P.1.4
25	1	9-12.P.1.3	2	9-12.P.1.5	2	9-12.P.1.3	2	9-12.P.1.3	1	9-12.P.1.5	2	9-12.P.1.3	2	9-12.P.1.3
26	1	9-12.L.1.3	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.3	1	9-12.L.1.3	2	9-12.L.1.3	2	9-12.L.1.3
27	1	9-12.E.1.1	2	9-12.E.1.1	2	9-12.E.1.1	1	9-12.E.1.1	1	9-12.E.1.1	2	9-12.E.1.1	2	9-12.E.1.1
28	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.1	2	9-12.L.1.1
29	1	9-12.S.2.1	2	9-12.S.1.2	2	9-12.S.1.2	2	9-12.S.1.2	2	9-12.S.1.2	2	9-12.S.1.2	1	9-12.S.1.2
30	1	9-12.S.1.2	2	9-12.S.1.2	2	9-12.S.1.2	2	9-12.N.1.1	2	9-12.S.2.1	1	9-12.S.1.2	1	9-12.S.1.2
31	1	9-12.E.1.2	2	9-12.E.1.2	2	9-12.E.1.2	2	9-12.E.1.2	1	9-12.E.1.2	1	9-12.E.1.2	1	9-12.E.1.2
32	1	9-12.P.2.2	2	9-12.P.2.2	2	9-12.P.2.2	2	9-12.P.2.2	1	9-12.P.2.2	2	9-12.P.2.2	1	9-12.P.2.3
33	1	9-12.S.2.1	2	9-12.S.1.2	2	9-12.S.1.2	2	9-12.S.1.2	2	9-12.E.1.3	1	9-12.S.2.1	1	9-12.S.1.2
34	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.3	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.1
35	1	9-12.E.1.3	1	9-12.E.1.3	2	9-12.E.1.3	1	9-12.E.1.3	1	9-12.S.1.2	1	9-12.E.1.3	1	9-12.E.1.3
36	2	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1	1	9-12.L.3.1
37	2	9-12.L.3.1	1	9-12.N.1.1	2	9-12.N.1.1	1	9-12.N.1.1	1	9-12.N.1.1	2	9-12.N.1.2	1	9-12.S.1.2
38	2	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1	1	9-12.L.3.1	1	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1

Table 11.8
DOK Levels and Objectives Coded by Each Reviewer
South Dakota Science 2008 Grade 11

Item	DOK0	PObj0	DOK1	PObj1	DOK2	PObj2	DOK3	PObj3	DOK4	PObj4	DOK5	PObj5	DOK6	PObj6
39	1	9-12.S.1.2	2	9-12.S.1.1	2	9-12.S.1.1	2	9-12.S.1.2	2	9-12.S.1.1	2	9-12.N.1.1	2	9-12.S.1.2
40	1	9-12.L.1.1	1	9-12.E.1.1	1	9-12.E.1.1	1	9-12.L.1.1	1	9-12.E.1.1	1	9-12.L.1.1	1	9-12.E.1.1
41	2	9-12.S.2.3	2	9-12.S.1.2	1	9-12.S.1.2	2	9-12.S.2.3	1	9-12.S.2.3	2	9-12.S.2.3	2	9-12.S.2.1
42	2	9-12.S.1.2	2	9-12.S.1.2	2	9-12.S.1.2	2	9-12.E.1.2	2	9-12.S.2.1	2	9-12.S.1.2	2	9-12.S.1.2
43	1	9-12.P.2.2	1	9-12.P.2.2	1	9-12.P.2.2	1	9-12.P.2	1	9-12.P.2.2	1	9-12.P.2.2	1	9-12.P.2.2
44	1	9-12.L.2.2	1	9-12.L.3.1	1	9-12.L.2.2	1	9-12.L.3.1	1	9-12.L.2.2	1	9-12.L.2.2	1	9-12.P.3.1
45	2	9-12.N.2.1	2	9-12.N.2.1	2	9-12.N.2.1	1	9-12.N.2.1	1	9-12.N.2.1	2	9-12.P.2.2	2	9-12.N.2.1
46	1	9-12.N.2.2	1	9-12.N.2.2	1	9-12.N.2.2	2	9-12.N.2.2	1	9-12.N.2.2	2	9-12.N.2.2	1	9-12.N.2.2
47	2	9-12.P.3.1	2	9-12.P.3.1	2	9-12.P.3.1	1	9-12.P.3.1	1	9-12.P.3.1	1	9-12.P.3.1	2	9-12.P.3.1
48														
49														
50														
51	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.3	1	9-12.L.1.1	1	9-12.L.1.1	2	9-12.L.1.3
52	2	9-12.S.2.3	2	9-12.S.2.3	2	9-12.S.2.3	2	9-12.S.2.3	2	9-12.S.2.3	2	9-12.S.2.3	1	9-12.S.2.1
53	1	9-12.P.1.5	1	9-12.P.1.5	1	9-12.P.1.5	1	9-12.P.1.5	1	9-12.P.1.5	1	9-12.P.1.5	1	9-12.P.2
54	2	9-12.L.2.1	1	9-12.L.2.2	2	9-12.L.2.1	1	9-12.L.2.1	2	9-12.L.2.1	2	9-12.L.2.1	2	9-12.L.2.1
55	2	9-12.P.1.4	2	9-12.P.1.4	2	9-12.P.1.4	2	9-12.P.1.4	2	9-12.P.1.4	2	9-12.P.1.4	2	9-12.P.1.4
56	1	9-12.P.3.1	1	9-12.P.3.1	1	9-12.P.3.1	1	9-12.P.3.1	1	9-12.P.3.1	1	9-12.P.3.1	1	9-12.P.3.1
57	2	9-12.P.2	2	9-12.P.2	2	9-12.P.2	2	9-12.P.2.3	2	9-12.E.2.1	2	9-12.P.2	2	9-12.P.2.2
58	2	9-12.L.2.1	2	9-12.L.2.2	2	9-12.L.2.2	2	9-12.L.2.2	1	9-12.L.2.1	2	9-12.L.2.2	2	9-12.L.2.2
59	2	9-12.E.1.2	2	9-12.E.1.2	2	9-12.E.1.2	2	9-12.E.1.2	2	9-12.E.1.2	2	9-12.S.1.2	2	9-12.E.1.2
60	2	9-12.N.1.2	1	9-12.N.1.2	2	9-12.N.1.2	2	9-12.N.1.2	1	9-12.S.1.2	1	9-12.N.1.2	1	9-12.N.1.2
61	2	9-12.S.2.1	2	9-12.N.2.1	2	9-12.S.2.1	1	9-12.N.2.1	2	9-12.S.2.2	2	9-12.S.2.1	2	9-12.N.2.1
62	1	9-12.E.1.1	1	9-12.L.1.3	1	9-12.L.1.3	1	9-12.L.1.3	1	9-12.E.1.1	2	9-12.L.1.1	1	9-12.L.1.3
63	1	9-12.E.2.1	1	9-12.E.2.1	1	9-12.E.2.1	1	9-12.E.2.1	2	9-12.E.2.1	1	9-12.P.2.2	2	9-12.E.2.1
64	2	9-12.L.1	1	9-12.L.1.3	2	9-12.L.1.3	1	9-12.L.1.3	1	9-12.L.2.2	2	9-12.L.1.3	2	9-12.L.1.3
65	1	9-12.L.3.1	2	9-12.L.3.1	2	9-12.P.3.3	1	9-12.L.1.3	1	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1
66	2	9-12.N.2.1	2	9-12.N.2.1	2	9-12.N.2.1	2	9-12.N.2.1	2	9-12.N.2.1	2	9-12.N.2.1	2	9-12.N.2.1
67	1	9-12.L.3.1	1	9-12.L.1.3	1	9-12.L.2.2	1	9-12.L.2.2	2	9-12.L.2.2	1	9-12.L.2.2	1	9-12.L.2.2
68	1	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1	1	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1	1	9-12.L.3.1
69	2	9-12.P.2.1	2	9-12.P.2.1	2	9-12.P.2.1	2	9-12.P.2.1	2	9-12.P.2.1	2	9-12.P.2.1	2	9-12.S.1.1
70	1	9-12.P.3.2	1	9-12.P.3.2	1	9-12.P.3.2	1	9-12.P.3.2	1	9-12.P.3.2	1	9-12.P.3.2	1	9-12.P.3.2
71	1	9-12.S.2.1	2	9-12.S.2.3	2	9-12.S.2.2	1	9-12.S.1.2	1	9-12.S.1.2	2	9-12.N.1.1	1	9-12.S.2.1
72	1	9-12.S.2.1	1	9-12.S.2.1	1	9-12.S.2.1	1	9-12.S.2.1	1	9-12.S.1.2	2	9-12.S.2.1	1	9-12.S.2.1
73	2	9-12.S.1.2	2	9-12.S.1.2	2	9-12.S.2.1	2	9-12.S.1.2	2	9-12.S.1.2	2	9-12.S.1.2	1	9-12.S.1.2
74	2	9-12.S.1.2	2	9-12.S.2.1	2	9-12.S.1.1	2	9-12.S.1.1	2	9-12.N.1.2	2	9-12.S.1.1	2	9-12.S.1.2
75	1	9-12.P.3.3	1	9-12.P.3.3	2	9-12.P.3.3	2	9-12.P.3.3	1	9-12.P.3.3	2	9-12.P.3.3	1	9-12.P.3.3
76	1	9-12.N.1.2	2	9-12.N.1.2	2	9-12.N.1.2	1	9-12.N.1.2	2	9-12.N.1.2	2	9-12.N.1.2	2	9-12.N.1

Table 11.8
DOK Levels and Objectives Coded by Each Reviewer
South Dakota Science 2008 Grade 11

Item	DOK0	PObj0	DOK1	PObj1	DOK2	PObj2	DOK3	PObj3	DOK4	PObj4	DOK5	PObj5	DOK6	PObj6
77	2	9-12.L.2.1	2	9-12.L.2.1	2	9-12.L.2.1	1	9-12.L.2.1	1	9-12.L.2.1	2	9-12.L.2.1	2	9-12.L.2.1
78	1	9-12.E.2.1	1	9-12.E.2.1	1	9-12.E.2.1	1	9-12.E.2.1	1	9-12.E.2.1	1	9-12.P.2.2	1	9-12.P.2.2
79														
80														
81														
82	2	9-12.P.3.2	2	9-12.P.2.1	2	9-12.P.2.1	2	9-12.P.3.2	2	9-12.P.3.2	1	9-12.P.3.2	1	9-12.P.2.1
83	1	9-12.N.2.1	1	9-12.N.2.1	2	9-12.N.2.1	1	9-12.N.2.1	2	9-12.N.2.1	2	9-12.N.2.1	1	9-12.N.2.1
84	1	9-12.E.2.1	1	9-12.E.2.1	2	9-12.E.2.1	1	9-12.E.2.1	1	9-12.E.2.1	2	9-12.P.2.2	1	9-12.P.2.2
85	1	9-12.P.1.2	1	9-12.P.1.2	1	9-12.P.1.2	1	9-12.P.1.2	1	9-12.P.1.2	1	9-12.P.1.2	1	9-12.P.1.2
86	1	9-12.S.1.1	2	9-12.S.1.1	2	9-12.S.1.1	1	9-12.S.1.1	1	9-12.N.1.2	2	9-12.S.1.1	1	9-12.N.1.2
87	2	9-12.P.2.3	2	9-12.P.2.3	2	9-12.P.2.3	2	9-12.P.2.3	1	9-12.P.2.3	2	9-12.P.2.3	2	9-12.P.2.3
88	1	9-12.E.1.3	1	9-12.E.1.1	1	9-12.E.1.1	2	9-12.E.1.3	1	9-12.E.1.2	2	9-12.S.2.3	1	9-12.E.1.2
89	1	9-12.L.3.1	1	9-12.L.3.1	2	9-12.L.3.1	2	9-12.L.3.1	1	9-12.L.3.1	2	9-12.L.3.1	1	9-12.L.3.1
90	1	9-12.P.3.2	1	9-12.P.3.2	1	9-12.P.3.2	2	9-12.P.3.2	1	9-12.P.3.2	1	9-12.P.3.2	1	9-12.P.3.2
91	1	9-12.S.1.1	2	9-12.S.1.1	2	9-12.S.1.1	1	9-12.S.1.1	1	9-12.N.1.2	1	9-12.S.1.1	1	9-12.S.1.1
92	1	9-12.E.2.1	2	9-12.E.2.1	2	9-12.E.2.1	1	9-12.E.2.1	1	9-12.E.2.1	2	9-12.E.2.1	1	9-12.E.2.1
93	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.1	1	9-12.L.1.1

Objective Pairwise Comparison: 0.7063
Standard Pairwise Comparison: 0.8776

Table 11.9
Objectives Coded to Each Item by Reviewers
South Dakota Science 2008 Grade 11

Low		Medium		High
0		6.322581		7

1 3540439	9-12.N.2.1	9-12.N.2.2	9-12.N.2.2	9-12.N.2.2	9-12.N.2.2	9-12.N.2.2	9-12.N.2.2
2 3540536	9-12.N.1.2	9-12.N.1.2	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1
3 3505317	9-12.N.1.2	9-12.P.2.2	9-12.P.2.2	9-12.P.2.2	9-12.P.2.2	9-12.P.2.2	9-12.P.2.2
4 3513686	9-12.N.2.2	9-12.N.2.2	9-12.N.2.2	9-12.N.2.2	9-12.N.2.2	9-12.P.2.2	9-12.S.1.2
5 3505301	9-12.L.1.3	9-12.L.1.3	9-12.L.1.3	9-12.L.1.3	9-12.L.1.3	9-12.L.1.3	9-12.L.1.3
6 3505263	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1
7 3523636	9-12.S.1.2	9-12.S.1.2	9-12.S.2.3	9-12.S.2.3	9-12.S.2.3	9-12.S.2.3	9-12.S.2.3
8 3505520	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.L.3.1
9							
10							
11							
12 3521834	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1
13 3505328	9-12.P.3.3	9-12.P.3.3	9-12.P.3.3	9-12.P.3.3	9-12.P.3.3	9-12.P.3.3	9-12.P.3.3
14 3540440	9-12.N.1	9-12.N.1.1	9-12.N.1.1	9-12.N.1.1	9-12.N.1.1	9-12.N.1.1	9-12.N.1.2
15 3505307	9-12.P.1.2	9-12.P.1.2	9-12.P.1.2	9-12.P.1.2	9-12.P.1.2	9-12.P.1.2	9-12.P.1.2
16 3505306	9-12.P.1.1	9-12.P.1.1	9-12.P.1.1	9-12.P.1.1	9-12.P.1.1	9-12.P.1.1	9-12.P.1.1
17 3505324	9-12.P.2.3	9-12.P.2.3	9-12.P.2.3	9-12.P.2.3	9-12.P.2.3	9-12.P.2.3	9-12.P.2.3
18 3513661	9-12.P.2.1	9-12.P.2.2	9-12.P.2.2	9-12.P.2.2	9-12.P.2.2	9-12.P.2.2	9-12.P.2.2
19 3521943	9-12.L.2.2	9-12.L.2.2	9-12.L.2.2	9-12.L.2.2	9-12.L.2.2	9-12.L.2.2	9-12.L.2.2
20 3521954	9-12.E.1.1	9-12.E.1.1	9-12.E.1.1	9-12.E.1.1	9-12.E.1.1	9-12.E.1.1	9-12.E.1.1
21 3540438	9-12.P.2.2	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1

Table 11.9
Objectives Coded to Each Item by Reviewers
South Dakota Science 2008 Grade 11

22 3505285	9-12.L.1.3	9-12.L.3.1	9-12.S.1	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2
23 3505541	9-12.L.2.1	9-12.L.2.1	9-12.L.2.1	9-12.L.2.1	9-12.L.2.1	9-12.L.2.1	9-12.L.2.1
24 3505310	9-12.P.1.2	9-12.P.1.2	9-12.P.1.4	9-12.P.1.4	9-12.P.1.4	9-12.P.1.4	9-12.P.1.4
25 3521900	9-12.P.1.3	9-12.P.1.3	9-12.P.1.3	9-12.P.1.3	9-12.P.1.3	9-12.P.1.5	9-12.P.1.5
26 3505535	9-12.L.1.1	9-12.L.1.1	9-12.L.1.3	9-12.L.1.3	9-12.L.1.3	9-12.L.1.3	9-12.L.1.3
27 3505511	9-12.E.1.1	9-12.E.1.1	9-12.E.1.1	9-12.E.1.1	9-12.E.1.1	9-12.E.1.1	9-12.E.1.1
28 3521824	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1
29 3523605	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.2.1
30 3540471	9-12.N.1.1	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.2.1
31 3521842	9-12.E.1.2	9-12.E.1.2	9-12.E.1.2	9-12.E.1.2	9-12.E.1.2	9-12.E.1.2	9-12.E.1.2
32 3523623	9-12.P.2.2	9-12.P.2.2	9-12.P.2.2	9-12.P.2.2	9-12.P.2.2	9-12.P.2.2	9-12.P.2.3
33 3505340	9-12.E.1.3	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.2.1	9-12.S.2.1
34 3505530	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.3
35 3521955	9-12.E.1.3	9-12.E.1.3	9-12.E.1.3	9-12.E.1.3	9-12.E.1.3	9-12.E.1.3	9-12.S.1.2
36 3505265	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1
37 3521888	9-12.N.1.1	9-12.N.1.1	9-12.N.1.1	9-12.N.1.1	9-12.N.1.2	9-12.L.3.1	9-12.S.1.2
38 3505266	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1
39 3541541	9-12.N.1.1	9-12.S.1.1	9-12.S.1.1	9-12.S.1.1	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2
40 3521952	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.E.1.1	9-12.E.1.1	9-12.E.1.1	9-12.E.1.1
41 3505287	9-12.S.1.2	9-12.S.1.2	9-12.S.2.1	9-12.S.2.3	9-12.S.2.3	9-12.S.2.3	9-12.S.2.3
42 3521957	9-12.E.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.2.1
43	9-12.P.2	9-	9-	9-	9-	9-	9-

Table 11.9
Objectives Coded to Each Item by Reviewers
South Dakota Science 2008 Grade 11

3513660		12.P.2.2	12.P.2.2	12.P.2.2	12.P.2.2	12.P.2.2	12.P.2.2
44 3521945	9-12.P.3.1	9-12.L.2.2	9-12.L.2.2	9-12.L.2.2	9-12.L.2.2	9-12.L.3.1	9-12.L.3.1
45 3540545	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.P.2.2
46 3505297	9-12.N.2.2	9-12.N.2.2	9-12.N.2.2	9-12.N.2.2	9-12.N.2.2	9-12.N.2.2	9-12.N.2.2
47 3521903	9-12.P.3.1	9-12.P.3.1	9-12.P.3.1	9-12.P.3.1	9-12.P.3.1	9-12.P.3.1	9-12.P.3.1
48							
49							
50							
51 3521825	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.3	9-12.L.1.3
52 3521865	9-12.S.2.1	9-12.S.2.3	9-12.S.2.3	9-12.S.2.3	9-12.S.2.3	9-12.S.2.3	9-12.S.2.3
53 3505311	9-12.P.1.5	9-12.P.1.5	9-12.P.1.5	9-12.P.1.5	9-12.P.1.5	9-12.P.1.5	9-12.P.2
54 3505538	9-12.L.2.1	9-12.L.2.1	9-12.L.2.1	9-12.L.2.1	9-12.L.2.1	9-12.L.2.1	9-12.L.2.2
55 3505526	9-12.P.1.4	9-12.P.1.4	9-12.P.1.4	9-12.P.1.4	9-12.P.1.4	9-12.P.1.4	9-12.P.1.4
56 3513664	9-12.P.3.1	9-12.P.3.1	9-12.P.3.1	9-12.P.3.1	9-12.P.3.1	9-12.P.3.1	9-12.P.3.1
57 3521883	9-12.P.2	9-12.P.2	9-12.P.2	9-12.P.2	9-12.P.2.2	9-12.P.2.3	9-12.E.2.1
58 3505543	9-12.L.2.1	9-12.L.2.1	9-12.L.2.2	9-12.L.2.2	9-12.L.2.2	9-12.L.2.2	9-12.L.2.2
59 3505274	9-12.E.1.2	9-12.E.1.2	9-12.E.1.2	9-12.E.1.2	9-12.E.1.2	9-12.E.1.2	9-12.S.1.2
60 3513689	9-12.N.1.2	9-12.N.1.2	9-12.N.1.2	9-12.N.1.2	9-12.N.1.2	9-12.N.1.2	9-12.S.1.2
61 3513680	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.S.2.1	9-12.S.2.1	9-12.S.2.1	9-12.S.2.2
62 3540524	9-12.L.1.1	9-12.L.1.3	9-12.L.1.3	9-12.L.1.3	9-12.L.1.3	9-12.E.1.1	9-12.E.1.1
63 3540409	9-12.P.2.2	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1
64 3521935	9-12.L.1	9-12.L.1.3	9-12.L.1.3	9-12.L.1.3	9-12.L.1.3	9-12.L.1.3	9-12.L.2.2
65 3521837	9-12.P.3.3	9-12.L.1.3	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1
66	9-	9-	9-	9-	9-	9-	9-

Table 11.9
Objectives Coded to Each Item by Reviewers
South Dakota Science 2008 Grade 11

3523629	12.N.2.1	12.N.2.1	12.N.2.1	12.N.2.1	12.N.2.1	12.N.2.1	12.N.2.1
67 3521948	9-12.L.1.3	9-12.L.2.2	9-12.L.2.2	9-12.L.2.2	9-12.L.2.2	9-12.L.2.2	9-12.L.3.1
68 3505262	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1	9-12.L.3.1
69 3523618	9-12.P.2.1	9-12.P.2.1	9-12.P.2.1	9-12.P.2.1	9-12.P.2.1	9-12.P.2.1	9-12.S.1.1
70 3521875	9-12.P.3.2	9-12.P.3.2	9-12.P.3.2	9-12.P.3.2	9-12.P.3.2	9-12.P.3.2	9-12.P.3.2
71 3523606	9-12.N.1.1	9-12.S.1.2	9-12.S.1.2	9-12.S.2.1	9-12.S.2.1	9-12.S.2.2	9-12.S.2.3
72 3521863	9-12.S.1.2	9-12.S.2.1	9-12.S.2.1	9-12.S.2.1	9-12.S.2.1	9-12.S.2.1	9-12.S.2.1
73 3505516	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.1.2	9-12.S.2.1
74 3513674	9-12.N.1.2	9-12.S.1.1	9-12.S.1.1	9-12.S.1.1	9-12.S.1.2	9-12.S.1.2	9-12.S.2.1
75 3513669	9-12.P.3.3	9-12.P.3.3	9-12.P.3.3	9-12.P.3.3	9-12.P.3.3	9-12.P.3.3	9-12.P.3.3
76 3505293	9-12.N.1	9-12.N.1.2	9-12.N.1.2	9-12.N.1.2	9-12.N.1.2	9-12.N.1.2	9-12.N.1.2
77 3521938	9-12.L.2.1	9-12.L.2.1	9-12.L.2.1	9-12.L.2.1	9-12.L.2.1	9-12.L.2.1	9-12.L.2.1
78 3505269	9-12.P.2.2	9-12.P.2.2	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1
79							
80							
81							
82 3513668	9-12.P.2.1	9-12.P.2.1	9-12.P.2.1	9-12.P.3.2	9-12.P.3.2	9-12.P.3.2	9-12.P.3.2
83 3521920	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1	9-12.N.2.1
84 3540408	9-12.P.2.2	9-12.P.2.2	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1
85 3505524	9-12.P.1.2	9-12.P.1.2	9-12.P.1.2	9-12.P.1.2	9-12.P.1.2	9-12.P.1.2	9-12.P.1.2
86 3523627	9-12.N.1.2	9-12.N.1.2	9-12.S.1.1	9-12.S.1.1	9-12.S.1.1	9-12.S.1.1	9-12.S.1.1
87 3513662	9-12.P.2.3	9-12.P.2.3	9-12.P.2.3	9-12.P.2.3	9-12.P.2.3	9-12.P.2.3	9-12.P.2.3
88 3505512	9-12.E.1.1	9-12.E.1.1	9-12.E.1.2	9-12.E.1.2	9-12.E.1.3	9-12.E.1.3	9-12.S.2.3
89	9-	9-	9-	9-	9-	9-	9-

Table 11.9
Objectives Coded to Each Item by Reviewers
South Dakota Science 2008 Grade 11

3521946	12.L.3.1	12.L.3.1	12.L.3.1	12.L.3.1	12.L.3.1	12.L.3.1	12.L.3.1
90 3521874	9-12.P.3.2	9-12.P.3.2	9-12.P.3.2	9-12.P.3.2	9-12.P.3.2	9-12.P.3.2	9-12.P.3.2
91 3540370	9-12.N.1.2	9-12.S.1.1	9-12.S.1.1	9-12.S.1.1	9-12.S.1.1	9-12.S.1.1	9-12.S.1.1
92 3521853	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1	9-12.E.2.1
93 3505298	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1	9-12.L.1.1

Table 11.10
Items Coded by Reviewers to Each Objective
South Dakota Science 2008 Grade 11

Low		Medium		High
0		12.25		53

9-12.N																				
9-12.N.1	14	76																		
9-12.N.1.1	14	14	14	14	14	30	37	37	37	37	39	71								
9-12.N.1.2	2	2	3	14	37	60	60	60	60	60	60	74	76	76	76	76	76	76	86	86
	91																			
9-12.N.2																				
9-12.N.2.1	1	2	2	2	2	2	8	8	8	8	8	8	45	45	45	45	45	45	61	61
	61	66	66	66	66	66	66	66	83	83	83	83	83	83	83					
9-12.N.2.2	1	1	1	1	1	1	4	4	4	4	4	46	46	46	46	46	46	46		
9-12.P																				
9-12.P.1																				
9-12.P.1.1	16	16	16	16	16	16	16													
9-12.P.1.2	15	15	15	15	15	15	15	24	24	85	85	85	85	85	85	85				
9-12.P.1.3	25	25	25	25	25															
9-12.P.1.4	24	24	24	24	24	55	55	55	55	55	55	55								
9-12.P.1.5	25	25	53	53	53	53	53	53												
9-	4	5	5	5	5	5														

Table 11.10
Items Coded by Reviewers to Each Objective
South Dakota Science 2008 Grade 11

12.P.2	3	3	7	7	7	7															
9-12.P.2.1	18	69	69	69	69	69	69	82	82	82											
9-12.P.2.2	3	3	3	3	3	3	4	18	18	18	18	18	18	21	32	32	32	32	32	32	
	43	43	43	43	43	43	45	57	63	78	78	84	84								
9-12.P.2.3	17	17	17	17	17	17	17	32	57	87	87	87	87	87	87	87					
9-12.P.3																					
9-12.P.3.1	44	47	47	47	47	47	47	47	56	56	56	56	56	56	56						
9-12.P.3.2	70	70	70	70	70	70	70	82	82	82	82	90	90	90	90	90	90	90			
9-12.P.3.3	13	13	13	13	13	13	13	65	75	75	75	75	75	75	75						
9-12.L																					
9-12.L.1	64																				
9-12.L.1.1	26	26	28	28	28	28	28	28	28	34	34	34	34	34	34	40	40	40	51	51	
	51	51	51	62	93	93	93	93	93	93	93										
9-12.L.1.2																					
9-12.L.1.3	5	5	5	5	5	5	5	22	26	26	26	26	26	34	51	51	62	62	62	62	
	64	64	64	64	64	65	67														
9-12.L.2																					
9-12.L.2.1	23	23	23	23	23	23	23	54	54	54	54	54	54	58	58	77	77	77	77	77	

Table 11.10
Items Coded by Reviewers to Each Objective
South Dakota Science 2008 Grade 11

	77	77																			
9-12.L.2.2	19	19	19	19	19	19	19	44	44	44	44	54	58	58	58	58	58	64	67	67	
	67	67	67																		
9-12.L.3																					
9-12.L.3.1	6	6	6	6	6	6	6	8	12	12	12	12	12	12	12	22	36	36	36	36	
	36	36	36	37	38	38	38	38	38	38	38	44	44	65	65	65	65	65	67		
	68	68	68	68	68	68	68	89	89	89	89	89	89	89							
9-12.E																					
9-12.E.1																					
9-12.E.1.1	20	20	20	20	20	20	20	27	27	27	27	27	27	27	40	40	40	40	62	62	
	88	88																			
9-12.E.1.2	31	31	31	31	31	31	31	42	59	59	59	59	59	59	88	88					
9-12.E.1.3	33	35	35	35	35	35	35	88	88												
9-12.E.2																					
9-12.E.2.1	21	21	21	21	21	21	57	63	63	63	63	63	63	78	78	78	78	78	84	84	
	84	84	84	92	92	92	92	92	92	92											
9-12.S																					
9-12.S.1	22																				
9-12.S.1.1	39	39	39	69	74	74	74	86	86	86	86	86	86	91	91	91	91	91	91		
9-	4	7	7	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3

Table 11.10
Items Coded by Reviewers to Each Objective
South Dakota Science 2008 Grade 11

12.S.1.2				2	2	2	2	9	9	9	9	9	9	0	0	0	0	0	3	3
	33	33	35	37	39	39	39	41	41	42	42	42	42	42	59	60	71	71	72	
	73	73	73	73	73	73	74	74												
9-12.S.2																				
9-12.S.2.1	29	30	33	33	41	42	52	61	61	61	71	71	72	72	72	72	72	72	73	74
9-12.S.2.2	61	71																		
9-12.S.2.3	7	7	7	7	7	41	41	41	41	52	52	52	52	52	52	71	88			

Table 11.11

Number of Reviewers Coding an Item by Objective (Item Number: Number of Reviewers)

South Dakota Science 2008 Grade 11

Low		Medium		High
1		3		7

9-12.N											
9-12.N.1	14:1	76:1									
9-12.N.1.1	14:5	30:1	37:4	39:1	71:1						
9-12.N.1.2	2:2	3:1	14:1	37:1	60:6	74:1	76:6	86:2	91:1		
9-12.N.2											
9-12.N.2.1	1:1	2:5	8:6	45:6	61:3	66:7	83:7				
9-12.N.2.2	1:6	4:5	46:7								
9-12.P											
9-12.P.1											
9-12.P.1.1	16:7										
9-12.P.1.2	15:7	24:2	85:7								
9-12.P.1.3	25:5										
9-12.P.1.4	24:5	55:7									
9-12.P.1.5	25:2	53:6									
9-12.P.2	43:1	53:1	57:4								
9-12.P.2.1	18:1	69:6	82:3								
9-12.P.2.2	3:6	4:1	18:6	21:1	32:6	43:6	45:1	57:1	63:1	78:2	84:2
9-12.P.2.3	17:7	32:1	57:1	87:7							
9-12.P.3											
9-12.P.3.1	44:1	47:7	56:7								
9-12.P.3.2	70:7	82:4	90:7								
9-12.P.3.3	13:7	65:1	75:7								
9-12.L											
9-12.L.1	64:1										
9-12.L.1.1	26:2	28:7	34:6	40:3	51:5	62:1	93:7				
9-12.L.1.2											
9-12.L.1.3	5:7	22:1	26:5	34:1	51:2	62:4	64:5	65:1	67:1		
9-12.L.2											
9-12.L.2.1	23:7	54:6	58:2	77:7							
9-12.L.2.2	19:7	44:4	54:1	58:5	64:1	67:5					

Table 11.11

Number of Reviewers Coding an Item by Objective (Item Number: Number of Reviewers)

South Dakota Science 2008 Grade 11

9-12.L.3												
9-12.L.3.1	6:7	8:1	12:7	22:1	36:7	37:1	38:7	44:2	65:5	67:1	68:7	89:7
9-12.E												
9-12.E.1												
9-12.E.1.1	20:7	27:7	40:4	62:2	88:2							
9-12.E.1.2	31:7	42:1	59:6	88:2								
9-12.E.1.3	33:1	35:6	88:2									
9-12.E.2												
9-12.E.2.1	21:6	57:1	63:6	78:5	84:5	92:7						
9-12.S												
9-12.S.1	22:1											
9-12.S.1.1	39:3	69:1	74:3	86:5	91:6							
9-12.S.1.2	4:1	7:2	22:4	29:6	30:5	33:4	35:1	37:1	39:3	41:2	42:5	59:1	60:1
	71:2	72:1	73:6	74:2								
9-12.S.2												
9-12.S.2.1	29:1	30:1	33:2	41:1	42:1	52:1	61:3	71:2	72:6	73:1	74:1	
9-12.S.2.2	61:1	71:1										
9-12.S.2.3	7:5	41:4	52:6	71:1	88:1							

Table 11.12
Number of Reviewers Coding an Objective by Item (Objective: Number of Reviewers)
South Dakota Science 2008 Grade 11

Low		Medium		High
1		3		7

1 3540439	9-12.N.2.1:1	9-12.N.2.2:6		
2 3540536	9-12.N.1.2:2	9-12.N.2.1:5		
3 3505317	9-12.N.1.2:1	9-12.P.2.2:6		
4 3513686	9-12.N.2.2:5	9-12.P.2.2:1	9-12.S.1.2:1	
5 3505301	9-12.L.1.3:7			
6 3505263	9-12.L.3.1:7			
7 3523636	9-12.S.1.2:2	9-12.S.2.3:5		
8 3505520	9-12.N.2.1:6	9-12.L.3.1:1		
9				
10				
11				
12 3521834	9-12.L.3.1:7			
13 3505328	9-12.P.3.3:7			
14 3540440	9-12.N.1:1	9-12.N.1.1:5	9-12.N.1.2:1	
15 3505307	9-12.P.1.2:7			
16 3505306	9-12.P.1.1:7			
17 3505324	9-12.P.2.3:7			
18 3513661	9-12.P.2.1:1	9-12.P.2.2:6		
19 3521943	9-12.L.2.2:7			
20 3521954	9-12.E.1.1:7			
21 3540438	9-12.P.2.2:1	9-12.E.2.1:6		
22 3505285	9-12.L.1.3:1	9-12.L.3.1:1	9-12.S.1:1	9-12.S.1.2:4
23 3505541	9-12.L.2.1:7			
24 3505310	9-12.P.1.2:2	9-12.P.1.4:5		
25 3521900	9-12.P.1.3:5	9-12.P.1.5:2		
26 3505535	9-12.L.1.1:2	9-12.L.1.3:5		
27 3505511	9-12.E.1.1:7			
28 3521824	9-12.L.1.1:7			
29 3523605	9-12.S.1.2:6	9-12.S.2.1:1		
30 3540471	9-12.N.1.1:1	9-12.S.1.2:5	9-12.S.2.1:1	
31 3521842	9-12.E.1.2:7			
32 3523623	9-12.P.2.2:6	9-12.P.2.3:1		
33 3505340	9-12.E.1.3:1	9-12.S.1.2:4	9-12.S.2.1:2	
34 3505530	9-12.L.1.1:6	9-12.L.1.3:1		
35 3521955	9-12.E.1.3:6	9-12.S.1.2:1		
36 3505265	9-12.L.3.1:7			
37 3521888	9-12.N.1.1:4	9-12.N.1.2:1	9-12.L.3.1:1	9-12.S.1.2:1
38 3505266	9-12.L.3.1:7			

Table 11.12
Number of Reviewers Coding an Objective by Item (Objective: Number of Reviewers)
South Dakota Science 2008 Grade 11

39 3541541	9-12.N.1.1:1	9-12.S.1.1:3	9-12.S.1.2:3		
40 3521952	9-12.L.1.1:3	9-12.E.1.1:4			
41 3505287	9-12.S.1.2:2	9-12.S.2.1:1	9-12.S.2.3:4		
42 3521957	9-12.E.1.2:1	9-12.S.1.2:5	9-12.S.2.1:1		
43 3513660	9-12.P.2:1	9-12.P.2.2:6			
44 3521945	9-12.P.3.1:1	9-12.L.2.2:4	9-12.L.3.1:2		
45 3540545	9-12.N.2.1:6	9-12.P.2.2:1			
46 3505297	9-12.N.2.2:7				
47 3521903	9-12.P.3.1:7				
48					
49					
50					
51 3521825	9-12.L.1.1:5	9-12.L.1.3:2			
52 3521865	9-12.S.2.1:1	9-12.S.2.3:6			
53 3505311	9-12.P.1.5:6	9-12.P.2:1			
54 3505538	9-12.L.2.1:6	9-12.L.2.2:1			
55 3505526	9-12.P.1.4:7				
56 3513664	9-12.P.3.1:7				
57 3521883	9-12.P.2:4	9-12.P.2.2:1	9-12.P.2.3:1	9-12.E.2.1:1	
58 3505543	9-12.L.2.1:2	9-12.L.2.2:5			
59 3505274	9-12.E.1.2:6	9-12.S.1.2:1			
60 3513689	9-12.N.1.2:6	9-12.S.1.2:1			
61 3513680	9-12.N.2.1:3	9-12.S.2.1:3	9-12.S.2.2:1		
62 3540524	9-12.L.1.1:1	9-12.L.1.3:4	9-12.E.1.1:2		
63 3540409	9-12.P.2.2:1	9-12.E.2.1:6			
64 3521935	9-12.L.1:1	9-12.L.1.3:5	9-12.L.2.2:1		
65 3521837	9-12.P.3.3:1	9-12.L.1.3:1	9-12.L.3.1:5		
66 3523629	9-12.N.2.1:7				
67 3521948	9-12.L.1.3:1	9-12.L.2.2:5	9-12.L.3.1:1		
68 3505262	9-12.L.3.1:7				
69 3523618	9-12.P.2.1:6	9-12.S.1.1:1			
70 3521875	9-12.P.3.2:7				
71 3523606	9-12.N.1.1:1	9-12.S.1.2:2	9-12.S.2.1:2	9-12.S.2.2:1	9-12.S.2.3:1
72 3521863	9-12.S.1.2:1	9-12.S.2.1:6			
73 3505516	9-12.S.1.2:6	9-12.S.2.1:1			
74 3513674	9-12.N.1.2:1	9-12.S.1.1:3	9-12.S.1.2:2	9-12.S.2.1:1	
75 3513669	9-12.P.3.3:7				
76 3505293	9-12.N.1:1	9-12.N.1.2:6			
77 3521938	9-12.L.2.1:7				
78 3505269	9-12.P.2.2:2	9-12.E.2.1:5			
79					
80					

Table 11.12
Number of Reviewers Coding an Objective by Item (Objective: Number of Reviewers)
South Dakota Science 2008 Grade 11

81				
82 3513668	9-12.P.2.1:3	9-12.P.3.2:4		
83 3521920	9-12.N.2.1:7			
84 3540408	9-12.P.2.2:2	9-12.E.2.1:5		
85 3505524	9-12.P.1.2:7			
86 3523627	9-12.N.1.2:2	9-12.S.1.1:5		
87 3513662	9-12.P.2.3:7			
88 3505512	9-12.E.1.1:2	9-12.E.1.2:2	9-12.E.1.3:2	9-12.S.2.3:1
89 3521946	9-12.L.3.1:7			
90 3521874	9-12.P.3.2:7			
91 3540370	9-12.N.1.2:1	9-12.S.1.1:6		
92 3521853	9-12.E.2.1:7			
93 3505298	9-12.L.1.1:7			

Table 11.13
Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])
South Dakota Science 2008 Grade 11

Low DOK		Matched DOK		High DOK
1		3		7

9-12.N [3]:								
9-12.N.1 [3]:	14:1 [1]	76:1 [2]						
9-12.N.1.1 [3]:	14:5 [1]	30:1 [2]	37:4 [1.25]	39:1 [2]	71:1 [2]			
9-12.N.1.2 [3]:	2:2[2]	3:1[2]	14:1 [1]	37:1 [2]	60:6 [1.5]	74:1 [2]	76:6 [1.67]	86:2 [1]	91:1 [1]
9-12.N.2 [3]:								
9-12.N.2.1 [3]:	1:1[1]	2:5[2]	8:6[2]	45:6 [1.67]	61:3 [1.67]	66:7 [2]	83:7 [1.43]	
9-12.N.2.2 [1]:	1:6[1]	4:5[1.4]	46:7 [1.29]					
9-12.P [2]:								
9-12.P.1 [2]:								
9-12.P.1.1 [2]:	16:7 [1.29]							

Table 11.13
Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])
South Dakota Science 2008 Grade 11

9-12.P.1.2 [2]:	15:7 [1]	24:2 [1.5]	85:7 [1]								
9-12.P.1.3 [2]:	25:5 [1.8]										
9-12.P.1.4 [2]:	24:5 [1.8]	55:7 [2]									
9-12.P.1.5 [2]:	25:2 [1.5]	53:6 [1]									
9-12.P.2 [2]:	43:1 [1]	53:1 [1]	57:4 [2]								
9-12.P.2.1 [2]:	18:1 [2]	69:6 [2]	82:3 [1.67]								
9-12.P.2.2 [2]:	3:6[2]	4:1[2]	18:6 [1.83]	21:1 [2]	32:6 [1.67]	43:6 [1]	45:1 [2]	57:1 [2]	63:1 [1]	78:2 [1]	84:2 [1.5]
9-12.P.2.3 [2]:	17:7 [1.71]	32:1 [1]	57:1 [2]	87:7 [1.86]							
9-12.P.3 [2]:											
9-12.P.3.1 [2]:	44:1 [1]	47:7 [1.57]	56:7 [1]								
9-12.P.3.2	70:7 [1]	82:4 [1.75]	90:7 [1.14]								

Table 11.13
Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])
South Dakota Science 2008 Grade 11

[2]:												
9-12.P.3.3 [2]:	13:7 [1.43]	65:1 [2]	75:7 [1.43]									
9-12.L [2]:												
9-12.L.1 [2]:	64:1 [2]											
9-12.L.1.1 [2]:	26:2 [1]	28:7 [1.14]	34:6 [1]	40:3 [1]	51:5 [1]	62:1 [2]	93:7 [1]					
9-12.L.1.2 [2]:												
9-12.L.1.3 [1]:	5:7[1.57]	22:1 [1]	26:5 [1.4]	34:1 [1]	51:2 [1.5]	62:4 [1]	64:5 [1.6]	65:1 [1]	67:1 [1]			
9-12.L.2 [2]:												
9-12.L.2.1 [2]:	23:7 [1.71]	54:6 [1.83]	58:2 [1.5]	77:7 [1.71]								
9-12.L.2.2 [2]:	19:7 [1.71]	44:4 [1]	54:1 [1]	58:5 [2]	64:1 [1]	67:5 [1.2]						
9-12.L.3 [3]:												
9-12.L.3.1	6:7[1.57]	8:1[2]	12:7 [1.86]	22:1 [1]	36:7 [1.86]	37:1 [2]	38:7 [1.71]	44:2 [1]	65:5 [1.6]	67:1 [1]	68:7 [1.57]	89:7 [1.43]

Table 11.13
Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])
South Dakota Science 2008 Grade 11

[3]:													
9-12.E [2]:													
9-12.E.1 [2]:													
9-12.E.1.1 [2]:	20:7 [1.14]	27:7 [1.57]	40:4 [1]	62:2 [1]	88:2 [1]								
9-12.E.1.2 [2]:	31:7 [1.43]	42:1 [2]	59:6 [2]	88:2 [1]									
9-12.E.1.3 [2]:	33:1 [2]	35:6 [1.17]	88:2 [1.5]										
9-12.E.2 [2]:													
9-12.E.2.1 [2]:	21:6 [1.83]	57:1 [2]	63:6 [1.33]	78:5 [1]	84:5 [1.2]	92:7 [1.43]							
9-12.S [3]:													
9-12.S.1 [2]:	22:1 [2]												
9-12.S.1.1 [2]:	39:3 [2]	69:1 [2]	74:3 [2]	86:5 [1.6]	91:6 [1.33]								
9-12.S.1.2 [2]:	4:1[1]	7:2[1.5]	22:4 [1.5]	29:6 [1.83]	30:5 [1.4]	33:4 [1.75]	35:1 [1]	37:1 [1]	39:3 [1.67]	41:2 [1.5]	42:5 [2]	59:1 [2]	60:1 [1]

Table 11.13
Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])
South Dakota Science 2008 Grade 11

	71:2 [1]	72:1 [1]	73:6 [1.83]	74:2 [2]						
9-12.S.2 [3]:										
9-12.S.2.1 [3]:	29:1 [1]	30:1 [2]	33:2 [1]	41:1 [2]	42:1 [2]	52:1 [1]	61:3 [2]	71:2 [1]	72:6 [1.17]	73:1 [2]	74:1 [2]
9-12.S.2.2 [3]:	61:1 [2]	71:1 [2]								
9-12.S.2.3 [3]:	7:5[1.6]	41:4 [1.75]	52:6 [2]	71:1 [2]	88:1 [2]					

Appendix C

Reviewers Notes and Source of Challenge Comments

South Dakota
Grades 5, 8, and 11
Science
2008

Brief Explanation of Data in the Alignment Tables by Column

Tables *grade*.5

Comments made by reviewers on items identified as having a Source-of-Challenge issue by item number.

Tables *grade*.7

All notes made by reviewers on items by item number.

Table 5.5
Source-of-Challenge Issues by Reviewer
South Dakota Science 2008 Grade 5

Item Number	Comments by Reviewer
10	The logging project question could have multiple answers depending on the inhabitants.
11	The actual ratio of earth diameter to sun diameter is 1:109. The sizes of the correct response range in ratio from .5 diameter of the earth to four times the diameter of the earth. The correct illustration used on this item has a ratio of 1:4.
11	Representing size of sun compared to earth- this is way off in terms of scale. In addition, this is a checked content item at grade 5
17	Aligns to check marked item.
17	Volcanoes are specifically mentioned in the checked items for this content.
26	The answer to the question about the hermit crab and sea anemone is mutualism and cooperation (the correct answer provided by the MC options) is a word similar in definition but it is not the best choice.
26	Parasitism and mutation are specifically mentioned in the checked items for this content- if not mastered is it fair to use terminology?
30	A student who knows that the direction of the motion of an object on earth is influenced by gravity and the amount of force applied to the object would know that both "a" the amount of gravity, and "c" how hard the ball was kicked will affect if it goes over or back down the hill.
33	The answer to the question about why the impala is not bothered by the oxpecker is "the bird keeps the impala healthy". I'd prefer an answer choice like "the bird keeps the impala clean or insect free" as there is a missing link between "insects" in the description and "healthy" in the answer. Also, do impalas know they're healthy? In other words, is that really the reason the "impala is not bothered"?
33	In the oxpecker question, can we really say that the impala knows the bird is keeping it healthy and therefore is not bothered?
34	I question the description of catalytic converter. If it really traps some of the gas wouldn't students find it logical that it might use less fuel?
35	The picture seems backwards- could be interpreted by students that grass eats grasshoppers etc.
36	There is a lot of extra junk in the question that may mislead students. The description or the diagram included dividing the planets into inner and outer by the asteroid belt is enough. The extra information may mislead students to choose an incorrect answer.
37	Some will argue that language can be "inherited" from parents. If my parents speak jkhkh there is a good chance that the offspring will, too.
38	The two answer options about the "most" efficient sail about size & shape and about texture may be an issue to students. If the texture of a sail meant that it was very rough/with many holes then the sail would not work as well. In addition, there are many shapes of sails that work very efficiently and the larger the sail the heavier and yet more wind. Seems to be some bias to students who know sails and those who do not.

Table 5.5
Source-of-Challenge Issues by Reviewer
South Dakota Science 2008 Grade 5

Item Number	Comments by Reviewer
41	The word "contains" bothers me when discussing male reproductive cells as the cells are on the anther not contained within it as assumed in the question.
47	Solutions are referred to in the checked items for this standard.
49	Decomposers provide nutrients to ALL organisms, producers and consumers both. They "directly" provide nutrients to producers.
52	Illustration could confuse students- they look at the picture from outside the book and Theresa from inside- so are they looking at the reverse?
74	Photosynthesis requires oxygen and hydrogen.

Table 5.7
Notes by Reviewer
South Dakota Science 2008 Grade 5

Item Number	Comments by Reviewer
2	Question does not address...how machine makes work easier...portion of standard.
4	A lot of unnecessary reading.
5	Students are indeed asked to analyze interactions of energy and matter when asked to identify the best "conductor." This does not match the standard on "heat flow." (8.P.3.1) Since it discusses conductors I set it with the standard here.
8	Layers hard to distinguish.
9	Is this a reading for inference question?
11	This item requires students to compare the relative size of earth to the sun which is a checked indicator.
11	Possible scaling issues between sun and earth.
11	Fits one of the checked objectives.
11	The sun is way too small.
	This is a check mark standard.
14	This is a check mark standard.
15	Answer is clued with ...need to buy and indoor plants. Cannot buy heat...can buy heater...while oxygen and carbon dioxide can be purchased. Kids will discount choices B and D immediately.
15	Can anything other than a light source be bought? A scuba diver could buy oxygen, I suppose, but this would have nothing to do with the question.
16	Another reading for inference question.
17	This is about the formation of geologic features, which is a checked indicator.
17	When explaining formation of geological features (in this case lava from mantle forming a volcano) students are meeting the checkmark ("explain the formation of geological features of the earth through plate tectonics") not the standard or bullets.
17	Fits one of the checked objectives.
17	A check mark standard.
18	Question does refer to gaseous and rocky celestial bodies which does describe composition universe as addressed in 5.E.2 but is above the requirements of 2.1 and 2.2 as specific standards (size, order, distance, brightness, etc.)
19	There is an argument that "keeping only two fish per day" is a type of conservation discussed in the checkmark not the indicator or benchmark/bullet.
19	A reading inference question.
20	A reading inference question.
21	Is water dripping or running off tarp?
26	The distractors contain the words adaptation, parasitism, and mutation which are checked items.

Table 5.7
Notes by Reviewer
South Dakota Science 2008 Grade 5

Item Number	Comments by Reviewer
26	Aligns with check marked indicator which aligns with adaptation, mutation, and parasitism
26	In the standard L.3.3 it says to describe & define interrelationships but being able to give vocabulary terms to describe these relationships is indicated by the check mark (future grade level). It is possible that students will be able to work with the term cooperation here but the other answer options (mutation, parasitism) are directly under this check mark.
26	A check mark standard.
30	Item should state..."on earth"...Answer choice A could be deemed a correct response. Question DOK 1 common knowledge on ball rolling up hill.
30	Could gravity affect this?
31	This item is about changes in states of matter, not defining matter by observable characteristics which is is a checked indicator.
32	Assuming raccoons eat the food, big assumption, no guarantee, should be stated.
32	A reading for inference question.
33	Answer choices clearly direct student to correct answer.
33	A reading for inference question.
34	A catalytic "converter" does not TRAP anything -- it CONVERTS bad things into less bad things.
34	Catalytic converters don't trap.
35	Diagram arrow after amphibian is confusing...assumes student knows to progress to small mammal.
36	Not to scale...should state in diagram. stretching item to indicator.
38	Sailing is not a typical method of transportation any more and yet I didn't know where else it would fit. Must be science and technology to evaluate sails but not stated in any of the standards.
38	Is a sail a simple machine...
38	Sails are indeed about forces, but not gravity and not really about the general things mentioned in 5P21.
38	I think there could be more than one answer, even with the word "most".
39	Students must have a large amount of knowledge about coal (its costs, burning coal as compared to wood, coal as a limited resource (which could be argued with the conservation practice checkmark in 5.S.2.1), and its efficiency to be able to answer this question. If required 5.S.1.2 is also an option.
39	A reading inference question.
47	This item requires students to explain the difference between solutions and mixtures...(ex. Solution) which is a checked indicator.
47	Aligns to the check mark explain the differences and similarities between a solution and other mixtures...

Table 5.7
Notes by Reviewer
South Dakota Science 2008 Grade 5

Item Number	Comments by Reviewer
47	"solution" (the answer to the question) and other types of mixtures are terms applied in the checkmark not the standard and are meant to be taught in future years.
47	Fits one of the checked objectives.
47	A check mark standard.
51	Since the stem tells that light spreads out as it travels, this item can be answered without any knowledge from the objective.
53	The student only needs to know how to read thermometers in the chart. The student is not measuring the temperature of the materials placed in the sunlight.
53	A check mark standard.
54	Students should be able to answer the question but it seems to be a question based on a collection of observations more than physical descriptions (5.P.1.1). The observations are a part of the checkmark in 5.N.2.1 and are meant to be tested in future years.
55	Would the box of apples have the ability to stay stationary on the 80% grade of the incline plane? Question discusses problems not how makes work easier
60	A reading inference question.
61	distractors ...fresh air and warmth, might be an issue
63	This question aligns very loosely to the concept of how organisms relate to the environment.
63	"hibernation" is the term being tested which is found in no 5th grade standard. It can almost have to do with biotic and abiotic effects but is at a higher level of knowledge than required by the 5.L.3.1 standard.
63	While hibernation is the result of a link between the organism and the environment, this item doesn't fit a specific objective.
63	A reading inference question.
65	While question has everyday application...not to keen on the item.
66	This question refers to a conservation practice of traveling with more people per bus and conserving fossil fuels. This is a checkmark under the standard and should be tested in future years.
66	No invention as indicator suggest is needed.
66	More people riding buses is an implication for the environment and for society, I don't think it fits a scientific change that affects transportation (5S11) or that it has to do with constraints (5S12).
66	A reading inference question.
67	This question needs to align with a standard that identifies types of energy which does not exist verbatim in grade 5
68	This question refers to a conservation practice of fall and spring hunting seasons. This is a checkmark under the standard and should be tested in future years.

Table 5.7
Notes by Reviewer
South Dakota Science 2008 Grade 5

Item Number	Comments by Reviewer
68	Fits one of the checked objectives. I believe it fits 5S21 better than 5L31 because 5S21 specifically mentions conservation in the checked objective.
68	A reading inference question.
72	This question is testing student knowledge of plate tectonic and formation of geological features when it answers "melted rock from the mantle can reach the surface through cracks in the crust, a checkmark under the standard and not a define and describe Earth's structure.
74	Water is composed of hydrogen and oxygen...thus question technically has three correct answers.
75	it doesn't seem that 5P21 would include the specific fact that the attraction force of magnets depends on OPPOSITE poles attracting each other.

Table 8.5
Source-of-Challenge Issues by Reviewer
South Dakota Science 2008 Grade 8

Item Number	Comments by Reviewer
16	Atomic number is defined as the number of protons in the nucleus. Both "a" and "d" have 6 protons in the nucleus. The difference between "a" and "d" is the number of electrons.
16	Model of an atom? I'm not an expert but think it should be an ion.
22	If, as the question states, the "liquid was gone", the liquid must not have been a mixture -- which is the only reasonable answer. A reasonable decision for a smart student would be to decide that the liquid was water, a compound, and get the question marked wrong.
30	Does all of society really desire to explore space?
38	The answer to the variable question is in the question itself
42	Perhaps nitrogen ion?
51	In most text (Glencoe, Pearson, etc) the changed variable is termed the "manipulated variable" and all variables are "experimental" (going into the experiment). I believe students will still choose the correct answer based on the choices but please check the terms for correct definitions.
56	In addition to asteroids, there are planets smaller than the earth.
56	Since there are planets that are smaller than Earth; there may be two correct answers to this question-asteroids and planets.
56	The question asks which of the following is smaller than Earth and both planet and asteroid are options. There are planets smaller than Earth, of course the BEST answer is asteroid but perhaps italicizing IS would ensure that the right answer is picked by students who know the content.
56	I'm quite certain there are planets smaller than earth and I don't count out the possibility of a planet sized asteroid
76	The question wants the "fact" that ocean currents are "mostly affected by the movement of global winds" but it doesn't take salinity, density, etc into effect. The wording of the answer should be to the effect: "are affected by the movement of global winds" and choose another answer to A.

Table 8.7
Notes by Reviewer
South Dakota Science 2008 Grade 8

Item Number	Comments by Reviewer
3	Reading question.
4	2 standards chosen. Not sure the questions directly attacks both (infrared satellite images and hurricanes) but it does require both sets of knowledge.
5	Reading question.
6	A check mark standard.
10	To answer this question the student must interpret a graph. The student is not asked to define a fact.
10	This question asks students to use the graph to determine which item is a fact. The focus is on determining a fact not constructing a graph.
10	The question asks which of the answers is a "fact based on the graph" which when reading the answers requires the knowledge of the definition of a fact, it is not a mere interpretation of the graph (N.2.1)
10	Students are using the graph to interpret data.
10	Asking students to use the definition of a fact, not designing an investigation. The student did not create the graph only using the graph created by someone else to determine if question was a fact.
10	We discussed whether the graph provided needed information: I think the question can be answered correctly, without looking at the graph, if one knows the definition of a fact.
10	I did not think this question was about defining a fact, but about interpreting the graph to come up with a fact.
12	Reading question.
15	The diagram gives the answer so clearly that a student need not have studied this objective to get the correct answer.
17	A check mark standard.
23	The question directs students to identify the reason for using a pH meter (acidity) which fits best under the nature of science standard about lab equipment but it is highly possible that students are at this level unfamiliar with acidity and pH. In the standards they learn about chemical changes and acid rain but this does not directly imply acidity.
24	Most likely bring cool, moist air...while B is the correct answer, the wording of the stem allows for justification of B.
24	A check mark standard.
25	Reading question.
27	Images could be clearer. The darkness of the images might hamper the ability to determine. Removing the shading and keeping just the black outline might be a good idea
29	Should we include theory...question goes from hypotheses to law?
30	Weak distractors.
30	Reading question.
33	How can we be sure ..."yet harder than apatite?" I could not locate information to determine the hardness.

Table 8.7
Notes by Reviewer
South Dakota Science 2008 Grade 8

Item Number	Comments by Reviewer
34	When students have to evaluate the "most" they are at a higher DOK than merely recall.
34	Not commonly taught in SD schools makes it a two. If it was commonly taught, would make it a DOK 1.
34	I thought the answer to this question was common knowledge.
36	Reading question.
38	Only one answer choice mentions time.
38	There was discussion about whether this item is at DOK 1 or 2. I give it a 1 because the answer is clearly given in the stem: I knew the answer before even looking at the distractors.
44	Only one answer choice is credible
44	A reading question.
49	Earth and moon should be half shaded.
55	This is almost precisely the same question as number 43.
57	Answer choices direct student to only one choice. Distractors should be changed.
58	Only one credible answer choice.
58	Reading question.
60	Answer choices are not labels but descriptions of data to place in chart. Either change stem to reflect this or change answer choices to reflect labels.
66	Reading question.
68	The aquifer question relates most closely to the water cycle- not addressed specifically in the standards, but by the indicator.
68	Reading question.
70	A check mark standard.
71	Students would have to know both density and the purpose of the objects pictured. Density is mass/volume. In the Earth standards students are directed to know specific gravity of rocks/minerals and density as it compares to ocean water but it seems they would have to have a higher level of knowledge to answer the question (8.E.1.1 and 8.E.1.5 may be possible standard matches as well). A better question for this grade would be asking students about measuring mass and showing the same images.
73	The standard speaks to erosion caused by humans, which is not covered by this standard.
73	The question targets weathering and erosion and asks for the most efficient and economical way to prevent it. Students would have to have knowledge of both erosion and the ability to solve societal issues.
73	This item could have been coded to 8S21, but that objective allows only for "problems created by human activity". Beach erosion is a natural event.
76	A check mark standard.
77	This item is about cloud formation, which is a checked indicator.

Table 8.7
Notes by Reviewer
South Dakota Science 2008 Grade 8

Item Number	Comments by Reviewer
77	This is asking students to use the definition of a fact, not designing an investigation. The student did not create the graph only using the graph created by someone else to determine if question was a fact.
77	A check mark standard.

Table 11.5
Source-of-Challenge Issues by Reviewer
South Dakota Science 2008 Grade 11

Item Number	Comments by Reviewer
20	The diagram is confusing. There is not enough of difference between what is land and what is water.
20	Diagram for water cycle is not clear what it represents...could be grass or water, beach or road
42	food is considered a commodity and is traded as such on the open markets
44	There seems to be an issue with this question. I was led to the correct answer of natural selection but it seems that the situation is describing competition (2 species - 1 native - 1 introduced) and not natural selection.
44	This is not an example of natural selection. It is an example of an invasive species in competition with native species. Nature is not selecting beneficial genes. There are no mutations. No beneficial adaptation has emerged through time.
46	some may also argue gloves as necessary for lab safety
71	multiple distractors could be considered true for alternative fuels
73	multiple distractors could be argued for resistance to cloning
74	question implies multiple answers "under which circumstances...."
91	Both communicating the results of research to others and abiding by applicable laws are ethical responsibilities of scientists.

Table 11.7
Notes by Reviewer
South Dakota Science 2008 Grade 11

Item Number	Comments by Reviewer
1	Only one distractor deals with safety.
2	Reading question.
12	Reading question.
14	Life on Mars and using a telescope to determine it would be N.1.1 question. However here it is asking students to understand the origin of scientific knowledge not evaluate it or determine how beliefs influence it.
17	This is a DOK of 2 because the student had to manipulate the formula, rather than plug numbers into a formula, to get the correct response.
17	Students have to manipulate an equation to answer the question, not simply plug and chug.
17	Must insert numbers and solve problem.
17	This is a "plug and chug" question, DOK 1, if this is commonly taught in SD.
20	The diagram in this item is not clear. It could be a body of water on the left, next to a shoreline, next to land, or it could be all land with a road going down the middle.
20	Diagram difficult to see arrows are moving from trees and is arrow 3 coming from a lake, meadow or ocean (road or beach?)
20	The diagram is quite confusing. My first answer was wrong because I misinterpreted the diagram. Is arrow 3 above a grassland or an ocean? Is that a river or a road winding through the middle? Why should the trees be involved in transpiration but not the grass on the right?
20	Is that water on the right-hand side of the picture?
21	DOK 2 because you need to analyze the picture in order to answer the question.
21	Distractors could use improvement.
22	This item is coded to a life science indicator because the outbreak of a disease will affect the stability of a population and easy global transportation is a human impact on this population.
22	The outbreak of disease and transportation does analyze implications of scientific advancement but it is not specific enough to put it in the "impact of scientific discoveries" category of S.1.2.
22	It's not at all clear where to code this item. I put it at the first one I thought fit, but how to decide between S12 and S21?
22	I thought this was more a human activity question than a science/society question. It could be aligned at S.1.2, if it is considered a science/society question.
23	Would the question better match stem with 1:4 ratio instead of fraction? Or, change word “ratio” to “probability.”
30	Unsure whether to categorize as S.1.1 or E.1.3. It does seem to be ethically related but is also human activity affecting land and atmosphere.
30	Reading question.

Table 11.7
Notes by Reviewer
South Dakota Science 2008 Grade 11

Item Number	Comments by Reviewer
33	Reading question.
35	Answer is very obvious.
35	Reading question.
36	Reading question.
38	Reading question.
40	This is the same question as #88, in 40 they ask for the activity that increases oxygen in the atmosphere and in 88 it is asking for the activity that decreases carbon dioxide - photosynthesis/planting grass. Redundancies that may lead to repeated student error.
42	Most kids will think of GE as General Electric, not genetically engineered.
43	Did not see any standards that directly reference to law of gravitation.
45	Should weight be mass in B?
53	No standard for universal gravitation.
55	The question asks students to use stoichiometry (part of the p.1.4 standard), but asks them to take the balancing of the atoms in the equation to a level past the standard (limiting reagents and mass) which seems to be above the level of 9-12 required objectives.
56	The diagram of the pinwheel is not necessary or helpful.
57	This item is about effects of size and distance on gravitational attraction between two objects. There is no indicator for this concept.
57	There is not an individual standard that addresses gravitational force.
57	There is no formula or indicator/standard for gravitational force calculations.
57	This item clearly has to do with forces, but there is no mention of the gravitational inverse-square law, nor is the appropriate equation given on the formula sheet.
58	Do not use information on chart to answer question.
59	Reading question.
60	Using observations students are asked to describe their role in the modification of hypotheses as done here with Galileo and the telescope.
60	This should be a common knowledge answer. The Venus example is classic.
61	Transportation, environmental impact, electricity, and the scientific method are used leading to standards: S.2.1, S.2.2, and N.2.1.
64	This item is about structures of an organism which helps it adapt to its environment. There is no indicator for this concept.
76	Reading question.
	No standard for evaluating a scientist's current work.
84	Diagram not to scale.
84	Scaling

Table 11.7
Notes by Reviewer
South Dakota Science 2008 Grade 11

Item Number	Comments by Reviewer
88	This is the same question as #40, in 40 they ask for the activity that increases oxygen in the atmosphere and in 88 it is asking for the activity that decreases carbon dioxide - photosynthesis/planting grass. Redundancies that may lead to repeated student error.

Appendix D

Debrief Summary Notes

South Dakota
Grades 5, 8, and 11
Science
2008

Table 5.15
Debriefing Summary
South Dakota Science 2008 Grade 5

A. For each standard, did the items cover the most important topics you expected by the standard? If not, what topics were not assessed that should have been?

· yes
· I would have liked to see some questions about elements and molecules. I didn't see any questions about these concepts (5.P.1.1). Also the standard 5.S.2.1 could have included some questions on human population pushing out native populations.
· I feel that each standard was covered during the assessment. Was a bit weak assessing the sun's ability to produce energy (light/het)
· Items for each indicator were located. I felt the assessment addressed the indicators. However I did not see items reflecting how simple machines reduce workload.
· Yes, a very good distribution.
· 5.P.3.1 and 5.P.3.2 were not given as many questions as other standards. Also, 5.L.2.1 and 5.E.1.1. The technology standards were addressed sparingly.

B. For each standard, did the items cover the most important performance (DOK levels) you expected by the standard? If not, what performance was not assessed?

· Yes
· I was unable to locate many level 3 questions.
· Seemed to match well.
· I was expecting a few more level three questions.
· I did not locate any DOK 3
· Yes, a good balance of DOK levels 1 and 2.
· Acceptable.

C. Were the standards written at an appropriate level of specificity and directed towards expectations appropriate for the grade level?

· The way the standards are written in 5.1.2.1 (use investigations...to accumulate knowledge) creates confusion when trying to understand what the teacher is to teach and what will be assessed. That happens in other areas of the standards where checkmarks are used to indicate indicators which will be assessed at a higher grade level.
· Generally speaking, yes.
· Seemed to match well. A lot of things going on, it would be difficult to develop a fluid curriculum to incorporate all of these very different concepts.
· Acceptable for grade 5.
· Yes
· Yes
· Acceptable.

Table 5.15
Debriefing Summary
South Dakota Science 2008 Grade 5

D. What is your general opinion of the alignment between the standards and assessment:

ii. Acceptable Alignment (2) : 29%
iii. Needs slight improvement (5) : 71%

E. Comments

· Some of the questions directly tested the chekmarked descriptions under the standard. We were directed that these checkmarks are information for future years and not this year and should not be assessed on this exam.
· Scaling issues in Earth Science and simple machine work reduction items in physical science,
· I am concerned about the reading levels of some items, largely because I found some items that had unnecessary sentences which would take time to read and study for important information even though no such information is included. A few items could not be connected to a specific objective.
· By reading inference questions, I mean that, even though there is a science standard match, the question could just as easily be on a reading test. No specific science knowledge is needed.

Table 8.15
Debriefing Summary
South Dakota Science 2008 Grade 8

A. For each standard, did the items cover the most important topics you expected by the standard? If not, what topics were not assessed that should have been?

· Yes.
· I didn't see any questions about convection currents in the mantle or changes over time (8.E.1.2). Also questions focusing on the rock cycle seemed to be missing. There were a lot of ocean based questions. Also, questions 55 and question 43 are nearly the exact same question, seems unfair to test it twice.
· I did not feel the influences of earth, moon and sun were well covered.
· The test nicely covered the indicators for grade 8.
· Yes, I thought there was a nice balance.
· A good distribution.

B. For each standard, did the items cover the most important performance (DOK levels) you expected by the standard? If not, what performance was not assessed?

· Yes.
· Generally a good balance between 1, 2, and 3
· Seemed to match DOK levels fairly closely. Some level 1 areas were heavy on vocabulary and yet the standards seemed at a level 1 but were listed at level 2.
· acceptable
· Yes
· Yes, I found about one-third of the items were at level 2. There were none at level 3, not too surprising for grade 8.
· Mostly ones.

C. Were the standards written at an appropriate level of specificity and directed towards expectations appropriate for the grade level?

· Yes
· In some cases the standard did not go into the depth required by some questions (ex. density is in the standards but knowing the formula is not, acidity is in the standards but pH is not, and eclipses are in the standards but partial and full eclipses are not).
· Acceptable
· Yes
· Yes.
· Reading level acceptable.

D. What is your general opinion of the alignment between the standards and assessment:

Table 8.15
Debriefing Summary
South Dakota Science 2008 Grade 8

ii. Acceptable Alignment (5) : 71%
iii. Needs slight improvement (2) : 29%

E. Comments

· I think a lot of the items use distractors that don't adequately seek out common misconceptions; they seem to be worded very closely to the terminology of the objectives.
· See grade 5 reading remarks. These kinds of questions appear in the 8.S section. I believe that many of the answers to these questions are common knowledge. In standard 8.N.1.1, it is incorrect to state that theory becomes law. Theories are replaced by new theories. A science law is a separate concept. Such statements result from the misconception that theories are tentative. They are not; they have great summary and predictive value.

Table 11.15
Debriefing Summary
South Dakota Science 2008 Grade 11

A. For each standard, did the items cover the most important topics you expected by the standard? If not, what topics were not assessed that should have been?

· Yes.
· There seemed to be many science and technology standards addressed and some of the other standards were met with few to no questions based on the indicated performances under each standard. I do not recall any questions that matched the taxonomy standard (L.1.2)
· Yes.
· No. In the group relating to force (9-12.P.2) There was only one item for P.2.1 but nine items for P.2.2 -- and most of them were about orbits, which is a special case not mentioned in the objectives.
· Not much for N.1.1 or N.1.2. Nothing for P.1.1. Little for p.1.5, or P.2.1, but lots of examples with the standard. Nothing for L.1.1, but lots of examples with the standard. Nothing for S.1.1 and S.2.1. There are enough "hits" on other indicators within each standard to spread out some questions to these lightly hit areas.

B. For each standard, did the items cover the most important performance (DOK levels) you expected by the standard? If not, what performance was not assessed?

· It was very difficult to determine a DOK (between 2 and 1) for many of the items which were aligned to science and society indicators. The difficulty lies in determining if the student has enough information from the stem to use reasoning to arrive at the correct response, or does the student have to know the correct answer because they are not able to use the information to get at the correct response.
· Seemed as if the design and analysis portions of DOK were missing in many of the questions. Hard to label questions above a 2, which was different from prior grade tests.
· Yes.
· No. I expected to see at least a couple at level 3.

C. Were the standards written at an appropriate level of specificity and directed towards expectations appropriate for the grade level?

· Yes.
· Many of the standards were repetitive and unclear in their specificity. The examples used were similar/same for several standard options.
· Yes.
· No. There are many items that cannot be reliably identified as matching only one of N1.1, N.1.2, S.1.2, S.21.
· At this point, reflecting on all three exams, I think there was a great deal of reading for kids to do.

Table 11.15
Debriefing Summary
South Dakota Science 2008 Grade 11

D. What is your general opinion of the alignment between the standards and assessment:

ii. Acceptable Alignment (3) : 43%
iii. Needs slight improvement (4) : 57%

E. Comments

· Overall I have the impression that there was an imbalance of indicators represented by questions on the 12th grade test. There seems to be more emphasis on applying questions to societal issues rather than the areas of physical, life, and earth science.
· See earlier reading comments. Some of these questions, at all levels, could be eliminated and more substantial science content questions asked. It was extremely difficult for us to decide between nature of science and science and technology standards. They are not clearly different.

Table 11.15
Debriefing Summary
South Dakota Science 2008 Grade 11